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DEPARTMENT OF COMMERCE

BUREAU OF FOREIGN AND DOMESTIC COMMERCE

E. E. PRATT, Chief

SPECIAL AGENTS SERIES—No. 125

MARKETS FOR AGRICULTURAL IMPLEMENTS AND MACHINERY IN ARGENTINA

BY

FRANK H. von MOTZ

Commercial Agent

WASHINGTON

GOVERNMENT PRINTING OFFICE

1916

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LETTER OF SUBMITTAL.

DEPARTMENT OF COMMERCE,
BUREAU OF FOREIGN AND DOMESTIC COMMERCE,
Washington, August 30, 1916.

SIR: Submitted herewith is the first of a series of reports by Commercial Agent Frank H. von Motz on the South American markets for agricultural implements and machinery. This report covers Argentina and gives in detail the market requirements of that country for all kinds of farm machinery, supplemented with useful information on agricultural conditions and trade methods, gathered during a personal investigation. The large and growing market in Argentina for this class of machinery is particularly attractive to American manufacturers, who now supply by far the larger share of the imports, and it is believed that this report will be of special interest and prove valuable in further extending sales.

Respectfully,

E. E. PRATT,
Chief of Bureau.

To Hon. WILLIAM C. REDFIELD,
Secretary of Commerce.

MARKETS FOR AGRICULTURAL IMPLEMENTS AND MACHINERY IN ARGENTINA.

I. INTRODUCTION.

PHYSICAL FEATURES OF THE COUNTRY.

Argentina occupies the southern portion of South America, on the Atlantic seaboard, between 22° and 55° 30′ south latitude and 54° 20′ and 73° 30′ west longitude. Its area, according to the latest figures obtainable, is 1,153,417 square miles, embracing a population of not quite 8,000,000 inhabitants, one-fifth of whom live in the city of Buenos Aires, the Federal capital. The density of population is 6.9 per square mile.

In order quickly to picture in one's mind just what Argentina represents, it is necessary to consider its physical aspects, and for that purpose the country may be divided into three sections—the Andean or western, the pampean, and the mesopotamian. The Andean section, as its name indicates, is mountainous. It contains numerous valleys of varied character, and abounds in mineral wealth, which, however, has not been exploited, owing to the lack of transportation facilities. It is doubtful if anything in the way of developing the natural resources of this region will be done in many years to come. Here, unlike in other parts of the Republic, the building of railroads is very expensive, there is not an abundance of agricultural products to be moved to insure a steady income, great stretches of arid land beckon neither the capitalist nor humble settler, and progress must be very slow. The northern and Andean Provinces and the western part of the southern Territories form part of this division.

The pampean section, comprising about nine-tenths of the whole country, embraces the southern and central parts of the Republic It is an immense plain more than 2,000 miles long, rolling toward the southeast. In it are the rich Provinces of Buenos Aires and Santa Fe and the Territory of the Pampa. In this vast district there are several low mountain ranges, but, generally speaking, it is a prairie, like that part of the United States lying north of Oklahoma, though more level, with fewer rivers and streams. Much of the eastern part resembles the broad prairies of northern Iowa. The western part might be compared with the Kansas prairie. The climate varies with the latitude. Severe winters are experienced in the south, especially in Patagonia, while the north is almost tropical, being visited only occasionally by light frosts of short duration.

In the region known as the Pampa, from the mouth of the La Plata River for about 600 miles westward toward the Andes Mountains and about the same distance from north to south, the climate might be compared with that of the Gulf States. The heat is great during the middle of the summer, and the winter cold is moderate. In the far

north there is a wet summer season, with a heavy precipitation. Along the eastern border of the region, in the south the rainfall will average about 32 inches a year, but gradually diminishes from east to west, so that much of the land near the mountains is too dry to be cultivated except by irrigation. Fortunately, the melting snows of the Andes, formed into streams, many of which lose themselves in the Pampa toward the east, provide irrigation. The whole of the Pampa, except the semitropical northern division just described, is bare and open prairie, covered with grass often 6 or 7 feet high, but without any trees except where they have been planted around the modest dwellings of the farmers. In this section are many lagoons and swamps and several salt marshes.

The mesopotamian division lies between the Rivers Parana and Uruguay, and comprises the Provinces of Entre Rios and Corrientes and the Territory of Misiones. At its southern extremity is the picturesque delta of the Parana, dotted with islands of rich black soil, to which cattle are often taken in a dry year when pastures on the mainland fail.

Advancing toward the north, the land becomes undulating. In the northern part of the Province of Corrientes the land dips in a remarkable manner, forming great lagoons and marshes, and again changes in character in the Territory of Misiones, where it is generally hilly and covered with forests which extend far inland.

MOUNTAIN SYSTEMS.

The mountains of the Republic belong to four separate systems—the Andean, the central, the southern, and the Misiones. The principal chain, the great Cordillera of the Andes, or Western Cordillera, extends the length of the Republic from north to south as far as Tierra del Fuego (Land of Fire), forming the boundary line between Argentina and Chile. In the north the peaks are very high, gradually diminishing in the south until they are almost lost in the undulating plains of Patagonia. The mountain systems of the northern Provinces belong to the Eastern Cordillera, the true Andean system known to the ancients as Antis

RIVER SYSTEMS.

The rivers of the Republic belong to five systems: (1) The Rio de La Plata system, comprising the Rivers Parana, Uruguay, Paraguay, Vermejo, Iguazu, North Salado, Carcarana, and all their tributaries; (2) the central system, comprising the Rivers Primero, Segundo, Tercero or Carcarana, the Cuarto, and the Quinto; (3) the Cordillera system, comprising all the rivers which rise in the Cordilleras, some of which lose themselves in the swamps or lagoons of the plains among them the western Vermejo, Jachal, San Juan, Mendoza, Tunuyan, Diamante, Atuel, and a number of others which traverse Tucuman and the western Provinces; (4) the Pampa system, comprising the rivers which cross the southern part of the Province of Buenos Aires and empty into the Atlantic Ocean; (5) the Patagonian system, comprising the rivers which cross the southern Territories from the Andes to the Atlantic; the principal ones are the Colorado, Negro, Chubut, Deseado, Santa Cruz, and the Gallegos.

The Rio de la Plata is formed by the junction of the Parana and Uruguay Rivers, which, with their numerous tributaries, drain nearly one-fourth of the South American Continent. In formation the La Plata is like a great gulf; it is about 29 miles wide at Buenos Aires and something like 125 miles wide where it enters the Atlantic Ocean. The depth of the river varies from 30 to 90 feet, but there are numerous sand and mud banks, dangerous to navigation, and great sums of money are spent to keep the channel to Buenos Aires open for ocean liners and above Buenos Aires for small steamers. The rise and fall of the river is little influenced by the tide; the freshets of its tributaries have a much greater influence, as also do the heavy winds which often prevail. The pampero, or stormy southwest wind, carries the water high onto the coast of Uruguay, often causing great damage to shipping.

Argentina has a coast line on the Atlantic Ocean of about 1,815 miles. The coast is generally low and sandy in the north, rising somewhat in the south, where it often terminates in bluffs.

SEASONS.

The seasons in Argentina, owing to its geographical position south of the Equator, are just the opposite from our own. The spring season is from September 21 to December 21, the summer season from December 21 to March 21, the autumn season from March 21 to June 21, and the winter season from June 21 to September 21. The dates given are about right for all the region in the latitude of the city of Buenos Aires. The farther north one goes the more tropical the climate; likewise the farther south one goes the more it is like traveling north in our own country, and consequently the exact date when any particular season opens will be subject to the corresponding changes.

CHARACTER AND DISTRIBUTION OF THE POPULATION.

When the Spanish adventurers arrived, about 1535, the vast territory now known as Argentina was inhabited only by a few wild Indian tribes to whom agriculture was unknown. The country was very poor in wild animals, and therefore did not furnish much food to the wandering Indians and their numbers did not increase. The Spaniards early realized the possibilities of the country and brought from Europe cattle and horses, many of which escaped to the open country and formed the nucleus of the herds of wild cattle and horses which roamed the pampas. These herds of cattle later furnished food to the Indians, and the horses furnished mounts with which they carried on their depredations and warfare against the defenseless towns and rude homes of the early settlers.

By 1852 most of the native Indians had disappeared; large numbers were killed in battle, and many died from the effects of diseases. Early in the nineteenth century an organized campaign against what few remained practically annihilated them, and of the early inhabitants there remained only a few partly civilized Indians in the north, who had learned to sustain themselves from the Indians of the west coast and who were harmless.

Slavery was prohibited by law, and consequently great numbers of Negroes who were taken to Brazil never were in demand in Argen-

tina nor were they permitted to go there. Even to this day very few Negroes are found in the Republic, and there are no signs of the infusion of Negro blood into the veins of Argentinians. In the northern Provinces one is confronted at every turn with the unmistakable signs of the infusion of Indian blood into the veins of the offspring of the earlier settlers.

For many years the major portion of the immigrants who came to settle in the fertile lands of the pampas, which an Argentine writer very aptly describes as "the image of the sea in land," were Spaniards. Later came the Italians, who now predominate among the foreign-born residents of the country. Many thousands of settlers came from other countries, a total of 20 different nationalities.

The early strife with the Indians and a succession of civil wars following the war of independence, the solitary life of the farmer or cattleman on the immense plains, where the only sight to greet the eyes was an uncertain horizon, losing itself in the vapors which rose from the earth, making it impossible to distinguish where the earth ended and the sky began, all helped to produce a type of pioneer, the "Gaucho," from whom the Argentinians have descended, and who, having all but disappeared, lives in the song and romance of the country. Virtues he had, for he was daring and loyal. Rising at dawn and not retiring until the night was well advanced, always occupied with his horses or cattle, the Gaucho had no opportunity to participate in any form of social reunion. The loneliness of his life created a rugged type, well able to care for himself, with a leaning toward stoicism. The Gaucho opened the way westward and northward across the plains, and his descendants, following in his steps, form a part of the present-day rural population. Generally speaking, they lead simple lives, with few comforts and no luxuries.

IMMIGRATION AND EMIGRATION.

The rest of the rural population is made up of immigrants, principally of Latin extraction, who came from Europe to establish homes for themselves. There is, however, a counter current of emigration of varying importance depending on whether or not there is a good harvest. Emigrants are mostly single men, or married men, who, leaving their families in Europe, go to Argentina to work during the harvest season and return to their homes for the harvest there. The following table of figures on immigration and emigration gives a good idea of the importance of this movement. Statistics for 1915 are not complete.

Years.	Immigrants.	Emigrants.	Excess of immigrants.	Years.	Immigrants.	Emigrants.	Excess of immigrants.
1908	255,710	85,412	170,298	1912	323,403	119,933	203,470
1909	231,084	94,644	136,440	1913	302,047	156,829	145,218
1910	289,640	97,854	191,786	1914	115,308	153,657	*a* 38,349
1911	255,772	120,709	105,063	1915	80,756	.....	.....

a Deficit.

A large percentage of the immigrants find employment in the country, either as farm laborers or as cattle or sheep men. About

one-fifth of the inhabitants of Argentina reside in the city of Buenos Aires, and there are a number of other cities whose combined population represents a high percentage of the total number of inhabitants. The rural population is chiefly engaged in agricultural and pastoral pursuits. What little manufacturing is done is carried on in the cities.

CITIES AND DISTRIBUTING POINTS.

BUENOS AIRES.

The city of Buenos Aires was founded in 1535 but does not possess any marks of antiquity, like European capitals, nor anything which recalls the past; everything is new. It is a cosmopolitan center and its different aspects suggest a great modern commercial city with plenty of activity. Buenos Aires is not an ocean port. It is situated on the La Plata River some 129 miles north and west of Montevideo, Uruguay, where the river offers its tribute to the Atlantic Ocean.

The approach by sea to Buenos Aires is dull and uninteresting. After leaving the Atlantic Ocean the vessel enters the La Plata River, which is like a great bay of muddy water, at times almost as rough as the open ocean, but more often, especially in summer, calm as a mill pond, reflecting the strong light and heat from the sun. Passing up the great river, about 30 miles wide, the only thing to attract the attention of the traveler is an occasional passing steamer or a dredge, assisting in the labor of keeping the channel open, which is done only at great expense.

It has fallen to the lot of Buenos Aires to become a great city, and no one doubts that it will continue to grow and exert its influence in every form of activity which may be initiated in Argentina. The largest city in the world south of the Equator, second only to Paris as a Latin center, Buenos Aires is the fourth largest city in the New World and tenth in population of the cities of the world. In Argentine commerce Buenos Aires occupies a monopolizing position; it is the center of Argentine culture and learning; all railways of importance converge within its limits; it is the center of the financial power of the country and the seat of the Federal Government.

PORT FACILITIES.

The beautiful avenues, parks, and public and private buildings form a setting for a part of the gay life of the capital. The docks and port show another aspect of the greatness of Buenos Aires. Some 25 years ago vessels had to lie several miles off the city and discharge their cargoes into lighters and their passengers into rowboats or launches. For a period of 250 years after its foundation Buenos Aires was prohibited by Spain from having any direct commercial intercourse with foreign countries. The port of Buenos Aires came into existence at the close of that period, or about 1755, when the first port work was started. After many delays and after a number of schemes had been put forward and rejected, a contract was entered into with Madero Bros., in 1882, for the completion of a modern port. The work was begun in 1886 and what is known in Argentina as the Madero Port was inaugurated in 1897. The combined ports contain 10,508 linear yards of wharfage, which serve for

loading and unloading ships drawing a maximum of 26 feet of water. The largest ship which can safely navigate in that depth is one with a capacity of about 14,000 tons. Most of the steamers trading between Buenos Aires and other ports are of 12,000 tons or less.

Access to the port is effected through a channel divided into two branches, a north branch and a south branch. The north channel has a depth of 21 feet at ordinary tide and enters the port at the north basin. Steamers from foreign ports land passengers at the docks in the north basin and baggage is inspected there by the customs authorities. The south branch, which has a depth of 18 feet, is carried from the main channel to the mouth of the Riachuelo, a small river south of the main port. Each branch of the channel is about 310 feet wide and has luminous buoys on each side every 1,500 feet.

The port consists of two basins and five docks. The docks are connected by narrow channels which permit only one ship to pass at a time. Bridges for foot passengers and traffic, operated by hydraulic power, can be swung across these channels. The total area of water inclosed by the port is 788,573 square yards. The north basin has two dry docks, respectively 490 and 585 feet in length, 65 feet wide at the bottom, 90.74 feet at the top, and 35.26 feet deep, which permit the dry-docking of any ship able to enter the port. The opening and closing of dock gates, flood gates, etc., and the operation of all cranes is done by hydraulic power, provided by three separate power houses located in the port and generating 1,325 indicated horsepower.

There are 24 warehouses, 21 of which belong to the Government; the other 3 are private property and are used exclusively for the storage of grain. The total capacity of the 24 warehouses is 740,365 cubic yards and the total floor space 151,451 square yards. There are nearly 50 miles of railway lines belonging to the port, and for raising heavy weights there is a floating crane of 40 tons capacity and several smaller ones.

Two classifying grain elevators, one each in Docks Nos. 2 and 3, have been completed. That in Dock No. 3 belongs to a Belgian company, has a capacity of 120,000 tons, and can discharge about 10,000 tons per day of 10 hours. It is built on a large platform of reinforced concrete, the towers being of brick. Attached to this elevator is a flour mill with a daily capacity of 4,000 sacks of flour. The elevator in Dock No. 2 belongs to the Central Argentine Railway Co. Its foundation goes down about 32 feet to the indurated mud or "tosca" underlying the surface stratum.

Although of large proportions, the present port facilities are inadequate in times of normal shipping. Accordingly, in 1911, a contract to extend the port facilities was entered into with C. H. Walker & Co. The plan calls for the expenditure of $24,012,789, and when completed will afford greatly increased facilities. The total accommodation provided will be sufficient to permit 20 vessels, each 500 feet long, to effect operations simultaneously, or permit of the annual movement of 3,425,400 tons. The contract stipulated completion within five years and seven months, a term which has had to be extended on account of the European war and which may have to be further extended. Arrivals of steamers and sailing vessels in 1914, excluding river and coasting steamers, totaled 1,938 steamers

and 101 sailing vessels, as compared with 2,421 and 168 for 1913. The 1914 returns are the lowest since 1908. Arrivals in 1915 included 4,117 steamers and 268 sailers. Sixty per cent of the maritime trade of Argentina is handled through the port of Buenos Aires. The arrivals according to countries were as follows:

Years.	British.	German.	Italian.	French.	Other.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
1911	61.00	10.75	9.50	6.00	12.75
1912	60.50	11.25	7.25	6.75	14.25
1913	59.00	12.00	7.75	7.00	14.25
1914	56.00	8.75	8.75	8.50	19.00

Over-sea vessels pay an entrance fee of 15 cents per ton or fraction thereof; in ballast, half that amount; on return from river ports to complete cargo, 2 cents per ton; vessels of 100 tons or less exclusively engaged in the coasting trade, three-quarters of a cent per ton; exceeding 100 tons, 1 cent per ton. Over-sea vessels berthed within the port pay dock dues of 5 cents per day for every 10 tons or fraction thereof; vessels engaged in the coastwise trade, of whatever tonnage, pay one-quarter of the foregoing rates. Vessels which leave the port to complete operations in the roads, unless ordered there by the health department, are subject to the same charges.

ROSARIO.

Rosario, the second city of the Republic, is situated on the River Parana about 129 miles north of Buenos Aires. It was founded in 1730 and is an active up-to-date commercial city of about 200,000 inhabitants. A double-track railway line, over which modern trains are run, furnishes a quick means of transportation between Buenos Aires and Rosario. Merchandise is transported on the river, as it is of sufficient depth to permit ocean-going vessels to tie up alongside the wharves. The port is an open one built along the river bank, and the proper depth is maintained by dredging. Port regulations and fees are, for all practical purposes, the same as those applying at Buenos Aires.

In Rosario many large Buenos Aires importers have established branch houses and warehouses. Stocks for these branches come direct from the United States or Europe. The farming district served by Rosario commercial houses is one of the richest regions in the entire Republic, and here, too, are found more farm owners than in any district outside that served directly from Buenos Aires. There are several important jobbers in Rosario who do not have houses in Buenos Aires but who are well known everywhere in the Republic.

BAHIA BLANCA.

Bahia Blanca is the third port in importance and is situated 450 miles south of Buenos Aires. The two cities are connected by several branches of the Great Southern Railway, and there is also a direct line from Bahia Blanca to Rosario. Bahia Blanca has a population of 65,000 and is of great importance commercially for the reason that it serves a vast extent of land to the southwest, west, and northwest.

A large part of the land westward, in the Pampa, has only been brought under cultivation within the last 10 years. Hence merchants in Bahia Blanca carry large and varied stocks of everything needed in the development of a new country, which is a vast open prairie and does not furnish material to build even a very modest home for the settlers. Here, as in Rosario, Buenos Aires importers have established branch houses in order to meet more satisfactorily the requirements of their customers.

OTHER CITIES.

Santa Fe and Parana, both river ports, are important cities and commercial centers of the districts in which they are located. The former, the capital of the Province of the same name, has ever been the seat of great political strife. The latter, the capital of the Province of Entre Rios, has had its share of political troubles, but, being more of a commercial center than Santa Fe, does not make so much of them.

Cordoba, capital of the Province of the same name, is a fine old city of some 165,000 inhabitants. Its ancient university and the fame of its men of letters are known and recognized throughout South America. In the city of Cordoba and in the villages and country surrounding it even to-day one sees in the dark-skinned inhabitants unmistakable signs of the commingling of the early Spanish settlers and the native Indians.

Of the northern cities Tucuman is no doubt the most important as well as one of the most attractive on account of the natural beauty of its surroundings. The climate is subtropical, and in summer the thermometer often registers 120° F. At the same time it is no uncommon sight to see snow on the near-by mountains.

Mendoza, capital of the Province of Mendoza, is the most important city and distributing point in the west. It is one of the oldest cities of the Republic, but there are few traces of antiquity, owing to the fact that the city was once all but destroyed by an earthquake. Beyond the city to the west lie the Andes Mountains, which contain about the only natural beauty to be found in Argentina.

In effect, then, three cities stand out as occupying eminent positions as distributing centers, and are, in the order of importance, Buenos Aires, Rosario, and Bahia Blanca.

ECONOMIC DEVELOPMENT.

As recently as 1852 only a very small percentage of the land was under cultivation and commerce had only begun to develop. The only wealth consisted of vast herds of cattle and horses. The early settlers had not been seafaring people, nor did their descendants turn to such a life. The country had been engaged in civil warfare practically since the war of independence. With the downfall of the dictator Rosas, on February 3, 1852, a new era began. Immigrants came from Europe, principally from Italy and Spain, and large amounts of European capital were invested in the country. Extending westward and southward and northward for hundreds of miles, with hardly a break of any kind, the vast prairies offered an ideal surface over which to build railways, which now cover every part of the country except the northern marshes and extreme southern wildernesses. From a

small beginning in 1857, the railway mileage had grown to over 24,000 miles in 1914. Immigrants closely followed the railway lines, and they have planted in crops or laid out in stock farms all the central part of the Republic, much of the land north and south of Buenos Aires, and have penetrated deep into the pampas to the west.

It is roughly estimated that there are 253,000,000 acres of land capable of cultivation. This amount, vast as it is, does not take into account the land along the foothills of the Andes and in the southern portion of the Republic, which has been deemed arid, but which may be made to produce by dry farming or other methods when the population becomes dense enough to make it worth while to devote attention to its exploitation. The total area under cultivation in 1914 was about 60,000,000 acres, or a little less than 25 per cent of the area susceptible of cultivation.

The value of all products exported rose from $22,367,312 in 1864 to $483,504,547 in 1913, but suffered a relapse in 1914, due to the world-wide conditions, during which year the exports totaled $349,-254,141. Exports in 1915 reached a total of $558,280,643.

The value of imports has increased in about the same proportion, the figures being as follows: 1864, $23,143,240; 1913, $421,352,542; 1914, $271,817,900; 1915, $226,892,733. In 1914 and 1915 imports were greatly reduced on account of conditions in the Old World and on account of high freight rates. At this time (May, 1916) it is difficult to conjecture what the position will be six months hence. An abundant harvest has given the farmers of the country large quantities of cereals, but little trading is being done and less exporting, owing to the difficulty of obtaining ships. Theoretically, the country has greater purchasing power than at any time in its history, yet the advance in freight rates, in some cases 400 or 500 per cent over rates which prevailed prior to the war, will make merchants cautious. Generally speaking, purchases will be confined to actual necessities until a more normal condition prevails.

RECENT FINANCIAL DEPRESSION.

The first signs of an approaching period of depression, and one of grave danger to Argentine finance, manifested itself shortly after the commencement of the first Balkan war. European capital, which had been freely invested in all sorts of enterprises, was needed at home and was not available at any price. All this happened when a long period of speculation had caused property values to rise enormously and even reach a dangerous point. In parts of the country there were crop failures for two successive years, and many tenant farmers abandoned land which they had leased, owing for rent; seed, maintenance, and in many cases for considerable sums of money that had been advanced to them.

Early in 1914 the outlook was very gloomy indeed. The values of farm land and city property fell in greater proportion and even more hurriedly than they had risen in prosperous times. Commercial failures were frequent and increased with dangerous rapidity. Banks immediately began to restrict credit and a majority of them suspended loans. The wheat crop had been only an ordinary one in many parts of the country, especially in the south; farmers did not even get enough grain for seed for the next planting. In May, when

it was time to harvest a very heavy corn crop, which everyone expected would make up in some measure for the loss of wheat, heavy and continuous rains delayed the work of the farmers, accentuating the position. An appeal was made to the National Congress for some measures of relief, but the Government, after having carefully studied the situation, held to the view that unwarranted speculation and excessive credit had been the main factors in bringing about the unfavorable position and declined to take any steps toward readjustment through legislation.

The dark days of June and July came and went and on August 1 there was a pronounced tendency to start a run on the banks. Fortunately for the credit of the country, it was Saturday, a day on which the banks close at noon, probably the only thing which prevented a panic. The startling news and war rumors which came from Europe caused further uneasiness, for every one had been looking toward Europe for relief from a situation which was becoming untenable. No one dared even hazard a guess as to what would happen if the public rushed to the Government Office for the Conversion of Money, to exchange paper for gold. On Sunday afternoon, August 2, the Government Ministers held a meeting and decided on the attitude the Government would assume in the face of the conflict. A decree issued in the evening closed all banks and the Government Conversion Office for one week. This permitted Congress, which was then in regular session, to get fuller details of the European situation and its effect on the country and to discuss without haste measures for relief.

The Government measure was passed by Congress in its regular session on August 5, 1914. It provided for a moratorium of 30 days for all banking liabilities due, or those about to fall due; suspended for 30 days the paying out of gold by the Conversion Office; and authorized the National Bank to temporarily use the conversion fund of $30,000,000 held by it, and if necessary convert it into currency to create a fund for rediscounting bills discounted by other banks, the National Bank having full power to act. The measures thus adopted afforded ample time for the public to carefully study every phase of the situation; calmness was regained in a very short time; commercial transactions were resumed, and every one felt that the situation was well in hand. Subsequent events revealed that the Government had, in consultation with representatives of the banks and prominent financiers, arrived at a correct decision. The banks resumed payment, but their opening did not cause a run, as confidence in them and in the Government was fully established by the prompt action of Congress.

Among numerous other laws passed during the regular session of Congress were one prohibiting the export of gold and one authorizing the Argentine legations abroad to receive gold in deposit, against which the Conversion Office in Buenos Aires would issue the corresponding paper money. The latter proved of great value to Argentine commerce.

The moratorium relating to internal transactions, having served its purpose, was soon suspended. The law relating to external transactions is as follows:

Obligations arising from international operations originating in the countries which are at war, or in which a moratorium prevails against firms established in the Republic,

are hereby considered to be prorogued until that situation disappears. When the situation which has originated this law shall have disappeared, the Government shall declare its effect to be suspended, giving 30 days' notice.

The following table shows the liabilities of all classes of failures, including compositions, bankruptcies, private arrangement of concerns, and civil cases. The amounts are in Argentine gold currency, $1 of which equals $0.965 United States currency.

Location.	1912	1913	1914
Buenos Aires city	$17,016,455	$51,344,931	$109,636,077
Buenos Aires Province	11,626,974	13,271,332	20,155,586
Santa Fe	5,453,070	4,920,043	21,274,709
Cordoba	1,855,271	4,479,913	8,554,044
In other parts of the Republic	4,081,007	6,104,013	29,621,850

The failures for 10 months of 1915, January to October, represented liabilities of only $58,954,991, and clearly indicate that commercial houses are now in a more promising position than at any time since early in 1913. Credits are restricted, and not much change in that respect can be expected until the close of the war. Large importing houses report collections very good. There has been a great falling off in sales, except in articles of prime necessity. Stocks are now low, and with another good harvest Argentina's purchasing power will be almost unlimited.

At this time, in commercial relations with other countries, Argentina is affected in much the same way as the United States in its foreign trade. It has no merchant marine for transporting its products nor can it, like the United States, command a sufficient number of vessels flying a foreign flag. Neutral vessels trading at the present time prefer the shorter haul between the United States and Europe to the long haul from Europe or the United States to Argentina.

Those who have long associated themselves with everything which has to do with Argentina and who have carefully studied her ups and downs are bound to be optimistic regarding her commercial future. Periods of depression rapidly take form at intervals of five to seven years. They are of short duration and the general effect is nearly always good. Dispersed with even greater rapidity than they form, a period of great activity is almost sure to follow. Manufacturers and merchants can profit greatly by keeping in close touch with the Argentine situation through reading one of the many periodicals or through correspondence with agents or direct representatives. Decided changes in the economic condition of the country are heralded by unmistakable signs many months in advance, which, passing unnoticed by the casual observer, will be clearly revealed to the student.

CHIEF INDUSTRIES.

Manufacturing industries have not been established on a large scale in Argentina, nor does it seem probable that they ever will be. In the first place, the country is without coal of very great value; other raw products, if they exist at all, are far removed from convenient centers, and cost of transportation would seem to indicate

that their utilization is a very remote possibility. An overwhelming percentage of the Europeans who come to the Republic naturally turn to agriculture, partly because in most parts of this country agriculture has developed in a care-free way and requires no special training or aptitude.

A condensed review of the industries related to agriculture and having influence on the market for agricultural machinery is given in the following pages. Values are in Argentine gold currency, $1 of which equals $0.965 United States currency; the ton is the metric ton of 2,204.6 pounds.

ALCOHOL.

The production of alcohol in 1914 does not compare favorably with the average production for the last 11 years, and it even fell below the production of 1903. The figures for the last three years are as follows: 1913, 4,860,686 gallons; 1914, 3,000,348 gallons; 1915, 4,322,300 gallons.

BEER.

Beer is a favorite beverage and is consumed in great quantities in every part of the Republic. On January 1, 1914, there were 35 breweries in operation, 5 of which closed during the year. The breweries are modern and sanitary and the quality of the product compares very favorably with that of any other part of the world. Most of the barley used is imported in the form of malt. The quantity imported during recent years is as follows: 1911, 19,565 tons; 1912, 22,264 tons; 1913, 24,636 tons; 1914, 17,488 tons.

The total production of beer compared with imports is as follows:

Years.	Production.	Imports.	Years.	Production.	Imports.
	Gallons.	*Gallons.*		*Gallons.*	*Gallons.*
1911	22,055,483	169,424	1914	26,520,904	135,410
1912	24,077,552	249,885	1915	16,133,229	.....
1913	27,616,694	228,858			

DAIRYING.

Of late years there has been a steady annual rise in the production of milk, but much room for improvement still remains. With the spread of agriculture over a large part of the territory once used only for grazing purposes, land rents have increased enormously. There is a great scarcity of suitable dairy hands, and little is known about modern appliances for handling milk in a hygienic manner, except in a few large establishments. Several of the latter are quite as up-to-date as one could find anywhere. The season of greatest milk production is during the spring and summer months, from October to April. At this time of the year everyone is occupied in the grain fields or with shearing, and labor, being in demand, commands a higher price than dairymen can pay.

Except in rare instances, milk cattle are not housed, nor are they fed rations of grain to keep them in good condition. They roam in large pastures, feeding on the native grasses, and at night and morning are milked in large corrals. Modern dairy barns with complete equipment, now so rapidly taking the place of former insanitary

barns and sheds in the United States, are little known in Argentina. The migratory tendencies of a large percentage of the rural population, except in the Province of Buenos Aires and a part of the Province of Cordoba, which now produce most of the dairy products, keep landowners in other parts of the country from improving their holdings. More settled conditions would lead farmers to give greater attention to the strictly industrial possibilities of their establishments.

Whatever gains are recorded in the dairying industry must come through a demand for its products from without the country. In Argentina milk is little prized as an article of diet in any of the many ways in which it may be used. Butter was until recently very little used outside the cities. Even now it is little used by the inhabitants of the interior, and in many places, on account of its perishable nature and the lack of refrigerating systems, is obtained with difficulty. Cheese, on the other hand, is in great demand by all classes of society. In 1912 some 68,500,000 gallons of milk were elaborated, of which 71 per cent came from the Province of Buenos Aires and nearly all the remainder from the Province of Cordoba. Other figures for the same year are as follows: Cream produced, 37,377,489 pounds; butter, 21,772,876 pounds; cheese from cows' milk, 12,390,382 pounds; number of creameries, 525; butter factories, 16; cheese factories, 129; mixed factories, 369. Of the 1,263 establishments, 224 did not operate during 1912. The value of the production is estimated at $8,067,400.

FLOUR.

There were 352 registered flour mills in the Republic in 1912, 52 of which were not in operation during that year. More than 1,217,000 tons of wheat were handled, yielding 840,118 tons of flour and 360,990 tons of by-products. The yield of flour from all mills averaged 69 per cent; those in the city of Buenos Aires yielded 70.76 per cent. The output and the amount exported in recent years was: In 1912, output 840,118 metric tons, exports 131,580 tons; in 1913, output 813,104 tons, exports 124,649 tons; in 1914, output 810,100 tons, exports 67,325 tons. The exports in 1915 were 116,049 tons. Brazil takes 80 to 85 per cent of the exported flour; the remainder goes to the United Kingdom and Europe.

For many years the city of Buenos Aires has been the flour-mill center, and the industry at that place is becoming more and more important each year. In 1912, 36 per cent of the flour was milled in Buenos Aires.

FORESTAL.

In the northern and southwestern portions of the Republic are found extensive forests, comprising various kinds of valuable woods. Among these, in point of value, quebracho ranks first. Quebracho colorado, or red quebracho, is a very hard wood much sought after for the extract it furnishes, which forms the basis of a preparation for tanning leather. When sawed into blocks it makes a very durable and attractive street pavement; no other wood can take its place for fence posts. It is so hard that nails or staples can not be driven into it, and when used for fence posts, holes through which the wires are

run are drilled in the posts at regular intervals. Other woods which are found in abundance are, lignum-vitæ, cypress, coigue, alerce, and manu. The latter three are native woods, of which, as far as can be ascertained, there are no American equivalents. There are over 300 sawmills, situated in various parts of the Republic, with a total capital of $7,136,784 and annual sales amounting to $15,546,147, and 9 quebracho-extract factories, with a total capitalization of $3,546,645 and annual sales of $4,073,333.

Owing to the scarcity of paper, brought about by the European war, considerable interest is being shown in proposal to utilize the wood of the "auracaria imbricata" to produce pulp for the manufacture of paper. The tree is found in great profusion in the southwestern part of the Republic, and a ton of pulp can be produced from four trees. One drawback to this proposal is the fact that the territory where the tree is found is far removed from important commercial centers, is served by only one railway, and cost of transportation would be an important item. The great waterways of the district might be used for transportation if proper boats were to be had.

The great forests of the Republic have been despoiled of their treasures for many years, seemingly without let or hindrance, yet they still represent untold wealth, and Argentinians are beginning to realize the necessity for more drastic legislation to conserve this heritage. A new method of exploitation must be agreed upon or the complete destruction of the forests will result.

Another influence of the war has been to curtail greatly the importation of coal. The railway companies and industrial and commercial houses have sought and are obtaining a substitute for this necessary article in wood from the forests. The value of forest products recently exported were: In 1912, $8,983,112; 1913, $10,617,985; 1914, $9,238,745; 1915, $19,011,708.

THE MEAT INDUSTRY.

The introduction and perfection of systems of cold storage and transport, which had its beginning in 1877, greatly stimulated the export of meat. Argentina was the first country to export frozen and chilled meat to Europe. The development of the meat industry, although differing in some particulars from practices in the United States, compares very favorably with the rapid progress which has been made here.

A large amount of American capital is invested in the industry in Argentina. Swift & Co., of Chicago, purchased the La Plata Cold Storage Co. in 1907 and the La Blanca Co. in 1909; in 1912 this firm acquired three-fourths of the capital stock in the New Patagonian Meat Preserving Co. and erected the San Julian works. In 1912 the La Blanca Co. passed from Swift & Co. to Armour and Morris. Armour & Co. have a fine new establishment at Rio Santiago, near La Plata. The works, opened July 4, 1915, cover 20 acres of ground and cost $3,500,000. The daily killing capacity is 1,500 cattle, 2,500 sheep, and 1,000 pigs.

There are in all 10 freezing and chilling factories, 2 more under construction, and 2 concessions have been granted for new works. By far the largest portion of the meat exported goes to the United Kingdom. Shipments to the United States have increased in importance

since the tariff on imported meat was removed. The first shipment, consisting of 1,000 quarters chilled beef, went to New York in August, 1913.

The preparation of "jerked" or salted beef is a native industry of the La Plata River countries. As an Argentine industry, however, since the establishment of the great packing houses, it is gradually becoming less important. In Uruguay and southern Brazil the industry is steadily expanding, owing to a growing demand for its product in the West Indies, where the climate does not permit importation of other forms of meat. Works in southern Brazil have been greatly favored by protective legislation.

The following table shows the value of meat cargoes exported and gives a good idea of the development of the industry:

Years.	Chilled and frozen beef.	Frozen mutton.	Sundry frozen meat.	Preserved meat.	Extract of meat.	Meat flour.
1904	$9,774,354	$7,089,287	$272,308	$242,861	$414,188	$4,885
1908	18,081,443	6,307,688	740,421	178,057	1,239,918	1,239,918
1910	25,370,815	6,008,133	721,618	1,215,370	3,046,680	1,267,964
1912	34,285,076	5,613,971	1,017,992	1,769,882	1,223,860	1,349,557
1914	36,896,726	4,695,001	1,032,877	1,308,737	862,968	106,651

Years.	Preserved tongues.	Live cattle.	Live sheep.	Concentrated soup.	Salted beef.	Total.
1904	$189,400	$2,852,820	$85,219	$114,044	$1,391,931	$22,431,297
1908	262,058	1,876,820	311,376	115,822	772,819	31,266,374
1910	284,352	4,056,450	231,540	204,293	1,033,020	43,440,235
1912	189,523	9,140,080	314,694	197,433	1,400,748	56,502,825
1914	150,985	3,482,990	156,255	367,158	568,444	49,628,792

MINES AND MINERALS.

The early adventurers who came to South America from Europe sought only gold and precious stones. The immense territory now known as Argentina, being less rich in minerals, did not attract as many settlers as the west coast countries. No doubt the early settlers knew that the country possessed minerals, but no mines had been opened and worked by the native Indians, and consequently there were no rich church and house ornaments to fall an easy prey to the conquerors.

The country is possessed of great mineral wealth, which is found in districts far from active commercial centers, without adequate means of transportation. Under the mining code of the Republic prospecting is allowed on all lands, and the discoverer has a prior claim to any wealth he may uncover. Copper and silver are found in the Province of Los Andes; borax in the north, in the Provinces of Salta and Jujuy; copper and gold are found in the Province of La Rioja and in Catamarca; gold and silver in San Juan; copper and petroleum, the latter in limited quantities, in Mendoza; wolfram and marble in San Luis; and petroleum in Chubut.

PETROLEUM.

At Comodoro Rivadavia, in the Territory of Chubut, are the Government-owned petroleum fields, which are managed by a commission of engineers appointed by the National Government. A law,

passed in October, 1910, provided for the exploitation of this source of wealth by the National Government for a period of five years. The term was extended another five years during the 1915 session of Congress. Under the terms of the act the Government may not sell or lease the reserve, which covers an area of more than 12,000 acres of land.

The product of the wells is a heavy oil with a very small percentage of light oil; it contains only about 0.14 to 0.24 per cent of sulphur, and its calorific power exceeds 10,000 calories. The oil, as it comes from the wells, may be used for fuel in internal-combustion motors of Diesel and semi-Diesel types. By the use of special burners it may be used as a fuel for generating steam in industrial plants and in locomotives, thrashing engines, and road rollers. The supply however is limited, only 165,000 tons having been marketed since the wells were opened in 1911. So far, only a few experiments in the way of distillation have been made, showing 5 per cent of benzine, 16.27 per cent of illuminating oil, 67 per cent of heavy oil, and 11.73 per cent of coke.

SUGAR.

A great portion of the northern part of the Republic is suited, by climatic conditions and the composition of its soil, to the growing of sugar cane. The first sugar plantation in Argentina, as well as the first mill for grinding the cane, was established by Jesuits in the middle of the eighteenth century in the Province of Tucuman. At the time of the expulsion of the Jesuits from the country, owing to the political situation, the industry became practically extinct and did not assume very great proportions until about 1880.

The Province of Tucuman now produces about 75 per cent of the total yield. Two other Provinces, Salta and Jujuy, are some day destined to occupy first place, as they have a deep rich soil which produces in abundance, and there is not so much danger from frost as in Tucuman. Adequate transportation facilities, however, are lacking and will hardly develop as rapidly as desired. There is a marked contrast between the beautiful cane fields of Cuba and those of the Province of Tucuman. The Cuban cane is strong and well developed and grows luxuriantly, being especially favored by the deep rich soil, the absence of frosts, and an abundance of rain. Tucuman cane is not as strong nor does it contain the high percentage of saccharine found in Cuban cane. It is often injured by frosts shortly before the harvest season in August and often suffers greatly from too little rainfall during the growing season.

The annual consumption of sugar in Argentina is estimated at 215,000 tons. During the period 1909 to 1913 from 15 to 38 per cent of the quantity required had to be imported. The following table shows the domestic production and imports:

Years.	Yield.	Imported.	Total.	Years.	Yield.	Imported.	Total.
	Tons.	*Tons.*	*Tons.*		*Tons.*	*Tons.*	*Tons.*
1909.....	127,822	19,760	147,582	1913.....	276,141	75,581	351,722
1910.....	148,509	56,823	205,332	1914.....	335,000	6,508	341,508
1911.....	180,092	51,902	231,994	1915.....	150,000	.....	.....
1912.....	147,249	30,076	177,325				

The 1914 harvest was the largest on record, and with a surplus stock of 90,000 tons on the market there were early indications of a very favorable price. With the first tidings of the outbreak of the European war came an unprecedented demand for Argentine sugar, resulting in the exportation of nearly 110,000 tons. The 1915 harvest fell more than 50 per cent below that of the previous year, caused by heavy frosts in June before the cane was ripe. The estimated production of 150,000 tons, together with a great stock of 100,000 tons on hand, will just suffice for home consumption.

Official returns of the sugar industry for the 1913 harvest are given in the table following:

Province or Territory.	Mills working.	Cane crushed.	Sugar produced.	Yield.
		Tons.	*Tons.*	*Per cent.*
Tucuman	27	2,611,947	229,114	8.8
Jujuy	3	399,790	37,481	9.4
Santa Fe	2	27,008	2,262	8.4
Chaco	3	65,157	5,212	8.0
Formosa	1	982	60	6.1
Corrientes	1	7,108	415	5.8
Salta	1	19,026	1,596	8.4

The total area under cultivation rose from 51,571 acres in 1888 to 263,549 acres in 1914. The fields of cane everywhere indicate that, aside from the increased area devoted to cane culture, much greater progress has been made in the mill than in the field. To assist in turning raw cane into sugar the latest appliances have been installed. On the other hand, little progress has been made in cultivation, and its advancement is retarded by the necessity of resorting to hand labor.

SALT.

Salt has been produced only in quantities sufficient for commercial purposes since 1903. The output during 1914 was very close to 30,000 tons, and in quality it compares very favorably with the best the world produces.

TOBACCO.

There were 1,446 registered manufacturers of cigars and cigarettes on January 1, 1915. Of this total a very small number manufacture cigars, many of those consumed being imported from Cuba and Brazil.

Cigarette smoking is indulged in to a greater extent perhaps in Argentina than in any other country on the American continent. Probably this is due to the fact that imported cigars are very expensive and only the most common grade is made in the country. For some years the cultivation of the tobacco plant attracted only indifferent attention. The efforts of the Department of Agriculture have succeeded in creating new interest in its cultivation.

The area under tobacco cultivation in three recent years is given in the following table:

Province or Territory.	1910	1912	1913
Corrientes	14,079	14,820	28,775
Tucuman	2,420	2,470	1,976
Misiones	1,976	1,462	731
Cordoba	148	.....	.....
Salta	3,725	3,725	3,725
Catamarca	1,146	1,160	1,111
Others	745	489	419
Total	24,239	24,126	36,737

The output of the tobacco factories in 1914 represented 382,286,496 packages of cigarettes, 288,345,522 cigars, and 10,006,482 pounds of tobacco in packages, the total value of which was about $37,967,382. The value of the 1913 product exceeded this figure by nearly $3,137,211.

WINE.

A bounteous nature has bestowed unexcelled conditions of climate and soil, favorable to the cultivation of grapes, in 12 of the Provinces and Territories of the Republic.

The total area of land devoted to the cultivation of vines is more than 262,365 acres. Few varieties are represented, French stock predominating. As the home production increases imports decrease in like proportion, especially with reference to the commoner grades of wine. The vineyards are for the most part the property of or are leased by Italians. Many of the wine makers come from Italy and their establishments are models of their kind, equipped with the very latest machinery and chemical appliances.

Statistics of wine production and imports for recent years are given below:

Years.	Production.	Imports.	Years.	Production.	Imports.
	Gallons.	*Gallons.*		*Gallons.*	*Gallons.*
1908	62,551,268	12,329,065	1912	92,633,662	10,061,212
1909	51,436,655	11,817,744	1913	102,817,290	8,845,619
1910	74,705,175	11,585,201	1914	.....	6,081,533
1911	83,191,209	9,774,522			

Ever since the outbreak of the European war Argentine banks have been extremely cautious in making loans. Even when good security was offered it often took months to arrange loans of small importance. This restricted commercial transactions in the vine-growing and wine-making districts, and many vine growers found it almost impossible to arrange for loans to tide them over the 1915–16 harvest. The money was needed to purchase supplies and pay for the labor necessary to handle the crop. An abundance of grapes everywhere gave early warning of low prices, which was one reason why bankers were timid about effecting new loans. Another, and perhaps the most important reason, was that bankers had already loaned large sums to the growers to enable them to bring a greater area under

cultivation, and in their opinion the condition of the industry, which had grown up so rapidly as to threaten overproduction, could not stand up under the strain much longer.

The Government early in 1916 lent its assistance, and an agreement was reached, through the assistance of a growers' protective association and a wine makers' association, which probably saved the industry many thousands of dollars and small growers and wine makers from utter ruin. It was known that overproduction would be the greatest difficulty with which growers would have to contend, yet few realized that the time of peril had already arrived and that instead of continuing to plant large areas to vines other crops would have to be planted to relieve the situation.

FOUNDRIES AND MACHINE SHOPS.

The industrial census for 1910 places the number of foundries and machine shops at 3,539. A great majority of these are neither more nor less than blacksmith shops and would receive that classification in the United States. Of this total only about a dozen are of real importance, and their situation and the demand which exists for their products will, with careful management, enable them to continue to increase their output.

Agricultural implements are manufactured at only two places in the Republic, viz, Tres Arroyos and Esperanza. Estilart & Cia have an establishment at Tres Arroyos where they turn out a special type of self-feeder for thrashing machines and other appliances, which will be dealt with in another part of this report. The Schneider factory at Esperanza is now equipped to make repairs for many American agricultural implements, and also manufactures a very close imitation of an American gang plow that is in great demand in Argentina.

II. AGRICULTURAL CONDITIONS.

The principal wealth of Argentina, aside from its great wealth in live stock, consists in immense crops of wheat, corn, linseed, and alfalfa, which, not being required for home consumption, are largely sent to Europe, and have placed the country in the front ranks of exporting countries. Only since 1852 has there been what might be termed an attempt to cultivate the soil, made rich through the decaying vegetable growth that covered it for centuries and favored by an ideal climate. The settlement of the country proceeded along much the same lines as were followed in the development of our Western States, but differed in at least one essential.

In the United States every effort was made by the Government to induce settlers to take up land. The new settlers, generally drawn from the peasant class of northern and central Europe, had no hope at the time beyond obtaining a home for themselves and their families, where hard work would enable them to acquire a certain degree of economic independence. This method of giving the land to bona fide settlers has had far-reaching consequences. All over the United States is a population of farmers who own their land and who have reached a state of economic independence unequalled in any like area on earth. The children of the early settlers grew up amid natural surroundings, were intelligent and well educated, and have contributed much to make our national life what it is.

In Argentina, however, no such system of dividing the land and giving it to settlers was ever originated. The land, before it began to be settled, was given in great tracts to political favorites or successful warriors, and, as old Spanish ideas prevailed, the rest of the people were content to live and work for the landowners. The country is and has always been a country of great estates, many of them containing 60,000 acres or more. The average holding is about 3,800 to 4,000 acres.

SUBDIVISION OF LARGE ESTATES.

Of late years the cutting up of large estates has steadily increased, due largely to the law of inheritance which provides for automatic division of estates between all the heirs. Argentine landowners regard their properties from a business standpoint the same as landowners in the United States and buy or sell at will. Therefore it often happens that a large estate will pass into the hands of a syndicate and, after being subdivided, will be sold in small tracts to colonists. The following table indicates how this division has been steadily proceeding for a 10-year period, 1902 to 1912.

Size of holdings in acres.	Province of Buenos Aires.		Province of Cordoba.		Province of Santa Fe.		Territory of Pampa.	
	1902	1912	1902	1912	1902	1912	1902	1912
25 to 72	8,366	14,001	3,930	5,671	4,200	6,876	.....	583
73 to 125	8,856	14,191	2,718	5,045	3,154	6,830	114	423
126 to 250	5,703	9,248	2,919	5,280	3,358	7,276	129	2,174
251 to 500	4,593	7,466	3,410	5,732	4,583	7,875	64	401
501 to 750	1,794	3,850	1,814	2,658	1,641	3,020	54	287
751 to 1,625	2,949	4,940	2,328	3,872	1,395	2,545	68	330
1,626 to 3,125	2,161	3,256	1,108	1,685	589	1,263	99	512
3,126 to 6,250	2,079	2,530	721	992	442	768	489	1,412
6,251 to 12,500	1,581	1,649	489	619	422	566	741	445
12,501 to 25,000	964	682	314	268	292	208	1,114	431
25,001 and upward	486	306	215	147	180	136	624	172
Total	39,532	62,119	19,966	31,969	20,256	37,363	3,496	7,170

A separate classification of holdings in the Province of Mendoza is necessary, as it is the seat of the wine industry, where holdings are small in comparison with other parts of the Republic:

Size of holdings in acres.	1902	1912	Size of holdings in acres.	1902	1912
2 to 10	2,964	5,093	751 to 1,625	221	309
11 to 20	849	2,224	1,626 to 3,125	160	158
21 to 65	831	2,198	3,126 to 6,250	128	162
66 to 125	468	938	6,251 to 12,500	121	115
126 to 250	333	632	12,501 to 25,000	69	50
251 to 500	266	453	25,001 and upward	167	137
501 to 750	112	178			

A large percentage of the descendants of the former Gauchos, especially those who have remained away from the cities, are occupied in handling live stock. On the other hand, the immigrants from Italy and Spain take naturally to agriculture. Those who remain in the country first work as laborers. After a few years they lease some land to work for their own account, paying from one-third to one-half the crop as rent, depending on what assistance they require from the landowner toward getting started.

The old system created but two classes in the country outside the cities—landowners and peons. The present tendency to divide large holdings is slowly and surely creating another class, a middle class, which will have far-reaching influences in shaping the destinies of the Republic.

According to the agricultural census of 1908 the number of holdings of a purely agricultural nature is 180,495, and of these the number worked by owners and their families represented about 60 per cent; 30 per cent were worked by tenants and approximately 10 per cent by joint ownership. In the cereal region, comprising the Provinces of Buenos Aires, Santa Fe, Cordoba, and Entre Rios, and the Pampa Territory, the holdings may be classified as follows: Crop season of 1906–7, owners 18,476, tenants 31,029, joint ownerships 7,551; 1910–11, owners 21,546, tenants 36,458, joint ownerships 7,107; 1912–13, owners 27,428, tenants 46,325, joint ownerships 10,323.

DAMAGE BY FROST, DROUGHT, AND LOCUSTS.

Probably there is no like area of land on earth where agricultural prosperity is so general as in Argentina. There are three risks, however, which may destroy the profits over a large part of the country. One is frost. In the northern portion of the country, where soil and climatic conditions favor the growing of subtropical crops, severe frosts often work havoc, without warning, particularly in the cane fields. This danger is also present in the southern and southwestern parts of the country. Drought is a second danger. In most parts of the country the average yearly rainfall is just sufficient for the needs of the agricultural and pastoral lands; a deficient rainfall causes heavy losses through scanty crops and death of cattle.

The third and perhaps greatest danger is from locusts, which often sweep over the country in great swarms. Locusts have three periods or stages of life, the mosquito, the hopping, and flying stages. During the mosquito stage, if it were not for the great expanse of territory which they cover, they might easily be destroyed. During the hopping stage it is more difficult to destroy them in large numbers; and during the flying stage is when they do great damage to growing crops. When traveling through the rural districts in the summer time it is a very common occurence to pass fields of a thousand or more acres of corn where the locusts have been feeding and have left nothing but the bare stalks. They also do great damage to other cereals and alfalfa, and no effective means has been found by which to combat them. Sometimes the locusts will not come for five or six years; again they may come each successive year for a period of three or four years. They often come in such numbers that trains have to be stopped for a time until they are clear of the rails.

AREA UNDER CULTIVATION.

From a modest beginning in the middle of the nineteenth century agriculture has grown and developed by leaps and bounds. Periods of wild speculation in land often brought on periods of depression, but these were generally of short duration, and did not affect the credit of the country. In all parts of the Provinces of Buenos Aires, Santa Fe, Entre Rios, Cordoba, and the Pampa Central there are thousands of acres of gently rolling land yielding enormous crops of wheat, corn, oats, linseed, and alfalfa.

The crops are planted, cultivated, and harvested in much the same manner as similar crops are handled in the United States. Fully 90 per cent of the machinery sold and in use is American made. One would hardly care to hazard a guess regarding the future possibilities of the country, considering that only one-quarter of the land which is known to be capable of cultivation is now in crops. The following table, based on the crop acreage of 1913–14, gives a good idea of the area under cultivation compared with the total area.

Divisions.	Total area.	Area cultivated.	Divisions.	Total area.	Area cultivated.
PROVINCES.			TERRITORIES.		
	Acres.	*Acres.*		*Acres.*	*Acres.*
Buenos Aires	75,364,887	23,053,932	Misiones	1,401,634	75,878
Santa Fe	32,451,354	10,554,532	Formosa	26,492,726	53,969
Cordoba	42,817,203	12,761,872	Chaco	33,748,845	50,968
Entre Rios	18,711,238	2,915,094	Pampa Central	36,039,029	4,556,581
Corrientes	21,458,113	737,150	Neuquen	25,935,000	103,873
San Luis	18,581,093	1,398,884	Rio Negro	51,067,250	221,188
Santiago del Estero	35,440,548	520,552	Chubut	11,375,833	52,289
Tucuman	6,669,000	465,026	Santa Cruz	69,839,250	8,768
Mendoza	36,155,366	675,298	Tierra del Fuego	5,310,253	741
San Juan	21,229,712	371,364	Los Andes	22,230,000	17,759
La Rioja	24,213,410	223,732			
Catamarca	23,548,239	185,143	Total	663,459,790	59,505,421
Salta	30,908,098	336,525			
Jujuy	9,908,709	164,403			

With a total area of more than 663,000,000 acres of land it is known that some 235,000,000 acres are capable of cultivation without resorting to dry-farming methods. There are, then, something like 175,000,000 acres of good land, varying from a deep vegetable mold to a mixed sandy loam, still to be brought under cultivation, and perhaps an equal quantity might be made productive by dry-farming methods or with suitable irrigation works.

The acreage planted in various specified crops in the 1913–14 and 1914–15 seasons is given in the following table:

Crops.	1913–14	1914–15	Crops.	1913–14	1914–15
	Acres.	*Acres.*		*Acres.*	*Acres.*
Wheat	16,235,000	15,465,000	Cotton	6,916	5,480
Linseed	4,394,000	4,256,000	Rice	13,027	.....
Corn	10,255,000	10,381,000	Vines	251,866	262,363
Oats	2,875,000	2,821,000	Peanuts	34,654	62,972
Barley	418,294	396,435	Potatoes	277,455	293,361
Rye	.....	227,981	Beans	64,837	64,837
Alfalfa	16,524,000	16,524,000	Vegetables	115,719	141,778
Tobacco	23,850	36,728	Other crops	5,475,990	5,513,815
Sugar cane	232,735	263,549			

In 1912 there were 147,000 acres planted to fruit trees, numbering about 14,400,000 trees and comprising nearly 8,000,000 peach, 2,200,000 orange, and 1,200,000 apple trees, the balance pear, apricot, and olive trees.

In 1913 the average yield of the principal crops per acre was as follows: Wheat, 28 bushels; linseed, 24.8 bushels; corn, 25.8 bushels; oats, 17 bushels.

The area under cultivation of vegetables is not large, yet it includes land devoted to truck farming and also the area sown or planted to vegetables by farmers. Residents in suburban towns and interior cities and towns do not plant and cultivate gardens. Market gardening operations are carried on near Buenos Aires, Rosario, Cordoba, and other large cities. Most of the cultivation and planting is done by hand and only a very limited number of gardeners use hand seed drills, wheel hoes, or other garden tools. Most of the market gardeners have very small tracts, many of them of only 1 or 2 acres, and the members of the family plant and cultivate by hand.

SOIL AND RAINFALL.

CENTRAL PROVINCES.

Buenos Aires.—The soil of the Province of Buenos Aires, especially along the river and for a long distance inland, is a light, black vegetable mold, becoming more sandy as one proceeds inland. In the southern part of the Province the soil in many places is very shallow, being underlaid by "tosca," or indurated mud, which often crops out on the surface. "Tosca" is a very hard substance and most of the land where it is found, unless the soil is deep, is used only for grazing purposes. Vegetable life does well when there is plenty of rain but dies out very soon in a dry year.

The sandy loam in the western parts of the Province is very fertile and deep and water is usually found at a depth of 10 to 15 feet. Rains are frequent in winter and irregular in summer. The average yearly rainfall, based on reports from 12 stations, 1902 to 1911, was 27.22 inches; in 1912, from 37 stations, 29.84 inches; in 1913, from 30 stations, 33.73 inches; in 1914, from 37 stations, 50.23 inches; first six months of 1915, from 36 stations, 21.45 inches.

In much of the southern region of the Province the land is plowed immediately after harvest and cross plowed a second time some two or three months later to kill any weeds that may have grown. For the first plowing moldboard plows are generally used; for the second plowing disk plows give much better results, as the soil has a tendency to allow a moldboard plow to shove it forward without properly turning it. At harvest time difficulty is often experienced with binders, headers, and header binders, because the light loose soil does not offer a firm resistance to the tractive effort of the harvester bull wheel, or main driving wheel, and for this reason special attention should be given toward furnishing lugs or creepers on bull wheels which will effectively overcome troubles caused by the wheel slipping in loose soil.

Pampa Central.—The soil of the Pampa Central, west of the Province of Buenos Aires, is a very sandy loam, and water is found at a greater depth below the surface as one goes from east to west. In the extreme western portion of the territory very little in the way of settlement has been attempted, owing to the lack of rainfall and water, the latter being found only at a very great depth. The average yearly rainfall, 1902 to 1911, based on reports from three stations in the more thickly populated area, was 16.76 inches. The average for succeeding years from six stations was: 1912, 15.32 inches; 1913, 7.76 inches; 1914, 16.95 inches; 1915, first six months, 11.58 inches. At one time the vast undulating plains of the Pampa were thought to be fit only for grazing purposes. Within the last 10 years, however, much land has been brought under cultivation. As the railways extend their lines the population will follow, opening large new districts to agriculture.

Santa Fe.—The southern region of the Province is a vast fertile plain of rich black soil of considerable depth, which becomes more and more sandy toward the central and western parts of the Province, without losing its fertility. The northern region is heavily wooded, crossed by many streams which discharge into the Parana, and the soil is a very fertile sandy loam.

The Province is one of the richest in agricultural products. Wheat, corn, linseed, and alfalfa are extensively cultivated and there are thousands of acres of fine pasture lands. The average annual rainfall for the period 1902 to 1911, according to reports from three separate stations, was 31.77 inches; for 1912, 33.42 inches, 20 stations reporting; for 1913, 34.22 inches, 15 stations reporting; for 1914, 28.64 inches, with reports from 20 stations; for the first six months of 1915, 22.97 inches.

Cordoba.—Generally speaking, the surface of the Province of Cordoba is flat with a gentle slope toward the east. In the north and west there are three mountain ranges, some of whose summits are more than 6,000 feet high. Between the ranges are numerous fertile valleys watered by many streams. The northeastern district is low and swampy and there are many lagoons in the southeastern part.

The land in the south and east is good agricultural land, but the weak point of this district is lack of rainfall. The soil of the Province is a very sandy loam with stretches of black vegetable mold. The average annual rainfall for the period 1902 to 1911 was 26.24 inches. The rainfall for 1912 was 14.47 inches; for 1913, 21.37 inches; for 1914, 28.21 inches; for the first six months of 1915, 13.96 inches; reports having been received in nearly every year from nine stations.

Entre Rios.—As its name would indicate, the Province is situated "between rivers," the most important of which are the Parana, Uruguay, and Gualeguay, all navigable. The surface of the Province is undulating and is crossed by many streams. The soil is a deep vegetable mold, which produces fine crops. After a heavy dew or after a rain the soil is quite sticky and somewhat difficult to plow, as the plow bottom will not scour readily; it is, however, when dry, firm enough to afford a good traction surface for heavy machinery. During the period 1902 to 1911 the average annual rainfall was 32.55 inches, reports having been taken from three stations. Rainfall for 1912, including reports from 11 stations, was 38.5 inches; for 1913, 44.03 inches; for 1914, 57.07 inches; for the first six months of 1915, 31.04 inches.

Corrientes.—The surface of the Province presents many variations. In the southern part it is similar to Entre Rios, an undulating, fertile, and well-watered plain. In the southwestern part there is a dense forest. In the north the land dips, forming numerous marshes and lagoons; here one finds a luxuriant tropical vegetation. In the rivers and lakes there are many islands, the home of wild animals and reptiles. Very little is known of a great part of this region, owing to the difficulties of navigation and the dense growth of foliage which makes travel through it almost impossible. For the period 1902 to 1911 the average annual rainfall was 47.07 inches; later figures are not available.

San Luis.—The northern portion of the Province is quite fertile, especially in the short and narrow valleys between the mountain ranges. The southern region is flat, arid, and almost sterile. The soil is nearly everywhere sandy. There is a vast region containing thousands of acres of land, inhabited by only a few descendents of the early settlers who intermarried with the native Indians. The only vegetation is a scanty growth resembling scrub oak. The people lead monotonous, uneventful lives, caring for a few herds of goats.

After one trip through the country in the heat of summer, when the speed of the train gathers a cloud of fine sand which penetrates everywhere, one is certainly glad not to have to live amid such desolate surroundings. The average annual rainfall for the entire Province for the period 1902 to 1911 was 21.49 inches. There are districts where it never rains, and others where it may not rain for eight or nine months at a time. San Luis is one of the poorest Provinces agriculturally, and seems destined to remain such for a very long time.

Mendoza.—In the north and east the Province is flat, the soil sandy, and the population scanty. It is a vast waterless tract of land with little vegetation. Toward the west, on account of the possibilities in the way of utilizing the melting snows of the Andes, formed into streams, conditions are wholly different. The soil everywhere is very sandy and contains alkali in great quantities, making it necessary to exercise the greatest care in the cultivation of crops lest the tender plants be burned. The average rainfall for the period 1902 to 1911 was 8.77 inches. Later figures have not been published.

Santiago del Estero.—The surface of the Province forms a great plain with a slope to the southwest. Almost the whole of the western and southwestern regions is a barren and sandy desert. The only cultivated district worthy of the name is a strip of land between the Rivers Salado and Dulce, whose waters are used for irrigation purposes. Along the Chaco and Cordoba boundaries there are large forests which are being exploited. The heat is very oppressive in summer. No figures on rainfall are given; it is everywhere scanty and in some districts practically no rain falls.

Tucuman.—The Province of Tucuman presents varied aspects. It has fertile plains and lofty mountains. The sun is nearly always shining, yet snow can be seen on the mountains at almost any time of the year. There is much wild and luxuriant subtropical vegetation. The soil is a dark rich loam, almost black, presenting quite a contrast to the very sandy soil of Santiago del Estero to the south. Rains are frequent in the late summer and early autumn; the melting snows from the high mountain peaks, formed into streams, furnish water for irrigation over a limited area.

San Juan.—Half of the Province is mountainous, containing many very fertile and well-watered valleys. The other half is composed of desert, marshes, and sand hills, with a sandy arid soil. There is little rainfall in the mountains and practically none elsewhere. Very little progress has been made in agriculture. Where wheat is sown the land is flooded before planting and again a short time before harvest time. The heads contain few grains of much weight, and there is great danger of losing the crop by the hot winds which prevail during the harvest season.

La Rioja.—Strictly speaking, there are only two regions in the Province of La Rioja; the eastern, a sandy barren tract of land with scanty rainfall; the western, a succession of well-watered and fertile valleys between mountain ranges which run parallel to the Andes. The scarcity of water precludes the possibility of doing much in the way of agriculture.

Salta.—The eastern part of the Province has an almost level surface, especially in the southeastern part. To the north and west there are

many mountains, among them high table-lands and fertile valleys. The climate is varied, ranging from tropical in the table-lands and valleys to temperate in the mountains. Many rivers furnish an abundance of water for irrigation purposes and there is generally plenty of rain in the spring and autumn, while winters and summers are mostly dry. The Province is rich in minerals, but exploitation is handicapped by inadequate transportation facilities. The soil in most parts is very rich and with further development the Province gives promise of becoming an important agricultural center.

Jujuy.—In this Province there are numerous well-watered valleys between the mountain ranges, where the climate, though temperate, is very damp. In the northwestern part of the Province the land rises in a high table-land where it is cold and dry. The Province, though rich in timber and minerals, has not developed very rapidly and must await the building of railroads before it can take its proper place as a producer of wealth.

NORTHERN TERRITORIES.

Misiones.—The surface of the Territory of Misiones is a vast undulating plain, seamed by rivers and streams that run their course through fertile soil covered with a luxuriant vegetation. Light breezes, which generally prevail after 9 or 10 o'clock in the morning, temper a hot but comparatively healthy climate. Minerals are known to exist in part of the territory, but have not been exploited. Every sort of hardwood is found in abundance. To add to the natural beauty of the Province, there has been added, seemingly for good measure, the beautiful Iguazu Falls, which are beginning to attract the attention of travelers and are deserving of a visit if one can spare the time. A few years ago a journey to the falls was fraught with inconvenience and even danger. The trip can now be made from Buenos Aires in comfort in a few days.

Chaco.—Along the eastern boundary of the Territory the land is low and is often flooded for several miles inland by the River Parana. Beyond the river the land gradually rises, forming a slightly undulating plain, crossed by many rivers and streams, and in which are many lagoons and marshes. The territory is densely wooded, and its forests furnish quebracho for export. The climate is hot, but healthy, in summer, and the winters are very mild and pleasant. Rains are frequent in summer and heavy dews during a greater part of the rest of the year provide moisture. Once the timber and undergrowth now covering the land have been removed, the Territory will no doubt make great progress as an agricultural country. The soil is rich, there is sufficient moisture, and most subtropical products will produce in abundance.

Formosa.—The territory is a vast plain containing many marshes and lagoons. Owing to the absence of means of communication, the population is scanty and there is little or no commercial activity. Agriculture has only begun in a small way, although the soil is fertile and there is sufficient rainfall. The climate is hot and enervating in summer, but mild and rather pleasant in winter.

SOUTHERN TERRITORIES.

Neuquen.—The northern part of Neuquen is very dry and sandy, with a scanty vegetation. In the west there are many fertile valleys with good pasturage and forests of valuable wood. Heavy snows in winter in the western region furnish an abundance of moisture.

Rio Negro.—The land in the northern part of the Territory, adjoining Neuquen, is very dry. To the south of this strip there is a wide area of very fertile soil. The land south of the Rio Negro and, in fact, the whole of the southwestern part of the Territory is almost barren, offering no inducements to settlers. Aridity and the severe winters will also greatly retard the exploitation of this district.

Chubut.—In the Territory of Chubut there are a few fertile valleys in the central portion, where cattle and sheep may be pastured. The rest of the central portion presents a broken, often stony, surface, and its greatest drawback is lack of moisture. The most fertile part of the Territory is found in the valleys between mountain ranges in the western part. A majority of the farmers and stockmen are Welsh. Wool is the chief article of export.

Santa Cruz.—In this Territory the strip of land along the east coast is valuable pasture land. In the northwest portion there is a large area of barren land. In the west near the mountains are extensive forests. Owing to the dry climate agriculture will never flourish, as the rainfall does not average 10 inches a year.

Tierra del Fuego.—This Territory, part of an island, the remainder of which belongs to Chile, is for the most part covered with wild grasses which sustain thousands of sheep. There are also forests of valuable hardwood in the central region. There is a heavy rainfall in the autumn and, generally speaking, the climate is cold and damp, not favoring agriculture.

IRRIGATION.

Irrigation is necessary in many parts of the Republic, and one project after another has been developed, covering a period of many years. Except in some of the southern districts, where irrigation works are of recent construction, the area served is, generally speaking, altogether too limited. Parts of the Province of Tucuman, where the soil is very fertile, still lack sufficient moisture, which can only be provided by a more extensive irrigation program to make them productive.

In the Provinces of Mendoza and San Juan much has been accomplished, especially in the western district, where the melting snows of the Andes, formed into streams, have made a sandy desert produce in abundance. Outside the range of irrigation, north and south and for many miles eastward, except along the banks of a few feeble streams, there is nothing but a monotonous tract of sand with scant vegetation. In the southern Territories of Rio Negro and Neuquen much is being accomplished by the Great Southern Railway, in cooperation with the National Government and under its direction, to provide by means of irrigation works sufficient moisture to insure the growing of crops in a large district where the soil is very fertile but where rainfall is deficient.

During the 1909 session of Congress a sum derived from various sources and totaling about $36,500,000 was made available for the

construction and exploitation of irrigation works throughout the entire Republic. The construction of irrigation works must be carried out under the supervision of the General Irrigation Board, a bureau in the Ministry of Public Works. Within districts of influence of any of the railway companies construction work is carried on by these companies under supervision. The railway companies must deliver such works to the Government at completion and they are maintained by the Government until the original cost, through taxes, without interest, is returned to the railway companies. Every property susceptible of irrigation, in districts where works have been completed, must pay the irrigation tax. Properties not improved by cultivation in such districts within five years after the completion of the work pay a tax increased by 20 per cent.

All along the western border of the Republic are vast areas of land which might be opened to cultivation by the establishment of irrigation works. However, the population of the country has not yet assumed proportions to make this step necessary. When these vast tracts of land are required to furnish sustenance for a larger population, or even before that time, there is no doubt that extensive irrigation works will be in process of exploitation.

FERTILIZERS.

Perhaps nowhere in the world is agricultural prosperity so general as in Argentina. It is nothing short of marvelous that the soil should be so fertile as to produce the same crops year after year without apparent injury, and yet this is what is being done in nearly all agricultural districts and without the aid of any kind of fertilizer. The holdings are everywhere large; a mild climate does not make it necessary nor even desirable to house cattle, and even manures are lost to the fields only used for cultivation. In some parts of the agricultural district, after the crops have been harvested, small areas are often sown to forage plants for the green feed which they furnish during the winter months. When these areas are again plowed for planting the following crops a certain amount of the forage crop is turned under by the plow and supplies humus to the soil. This is the only way in which fertilizer ever reaches the soil in Argentina, except in the vine-growing districts, where commercial fertilizers are used in a very small way.

LARGE ESTATES.

The statement that there are many large estates in Argentina would not be complete without a description of a typical large estate. Many of the grants of land which now form parts of large estates were, at the time when given, far removed from the then existing large cities. Oftentimes they could not even be reached by railroads, and long journeys across country were necessary to get to them. Now all that is changed. The rapid expansion of railway lines to every part of the immense agricultural districts and to the northern and western boundaries of the country has placed all the estates within easy reach of some of the larger cities, if not the Federal capital itself. One large estate, which is often visited by travelers from all parts of the world and which is similar in most respects to others, comprises about 60,000 acres of land, most of which is divided into 1,000-acre fields sown to alfalfa.

Other fields are planted to corn, which is used for feeding fine imported stock for breeding purposes. A railway crosses the estate near one of its borders, where a small station has been built. From the station to the farmhouse—mansion would be a more appropriate term—there is a wide avenue between fields of alfalfa, lined on both sides with several rows of "paraiso" (paradise) trees, not very tall, but remarkably straight, whose featherlike foliage is never despoiled by the invading swarms of locusts. Running as straight as an arrow for a distance of more than 2 miles, the avenue terminates in a sort of park filled with all kinds of trees, plants, and flowers, in the midst of which is set the home of the owner.

The house, a two-story brick building covered with stucco, is large and comfortable and is tastily furnished with the best of everything from many parts of the world. It is equipped with electric lights, running water, and modern baths. A long-distance telephone enables the owner to get daily market reports and news of interest. Separated from the house by trees and shrubs one finds brick barns, in which prize cattle are housed, brick sheds, and granaries. There is also a well-equipped machine shop and a garage for several automobiles. Intersecting each other at right angles broad, well-graded avenues, like the one which runs from the station to the farmhouse, furnish places where the automobiles may be used. Some of the fields of alfalfa are used for pasturing the herds of cattle belonging to the estate; others are kept for hay, and the alfalfa is cut, cured, and stacked in the fields until it is wanted for feed or is baled to be sent to market.

One of the most noticeable things about the estate is its fine fences, typical of what one sees everywhere in Argentina. Fences are mostly of smooth wire, seven to nine lines of wire being used, one or possibly two of which, the upper ones, are sometimes of barbed wire. The posts, generally of quebracho or algarroba, native hardwoods, are set about 25 feet apart. Holes are drilled in the posts and the wire is passed through them. Staples are never used to fasten the wire to the posts. About every 100 feet is a tourniquet, fastened by clamping it around the post, for each line of wire. The tourniquet has a cylinder, in the center of which is a hole to engage the wire. On one end of the cylinder there is a toothed or ratchet wheel which may be held in any desired position by a pawl. On the other end is a square head to which a wrench may be applied to give the wire the desired tension. In building a fence, after the posts are set, the wires are strung through the holes in the posts. Both ends of the wires are passed through the holes on the cylinders of the tourniquets, one at each end, and the wire is stretched tight by winding it around the cylinders. In most parts of the country light steel bars or wooden strips are placed vertically between the fence posts at distances of 5 feet and firmly secured to the fence wire so as to keep animals from getting through the fence by spreading the wires apart. These wooden strips, called "varillas," serve the same purpose as vertical wires do in woven-wire fencing in the United States.

The number of employees on an estate of this size varies accordingly as it is used, whether mostly for stock raising or mostly for agriculture. The employees are generally housed in comfortable, permanent quarters, not far from the main house. The owners of

these big estates are proud of their places, as they have a right to be. Many of them have spent enormous sums of money in acquiring the best pedigreed stock the world produces. The annual stock show at the grounds of the Rural Society, in Palermo, a suburb of Buenos Aires, aside from its attraction as a society event, is a continual incentive to individual owners to bring up the quality of their herds. Fabulous prices are paid for prize winners, which, if stated in terms of dollars and cents, might earn an undesirable sobriquet for any one who dared mention them to people who are not in close touch with actual conditions in the country and who do not know how much pride stockmen take in their herds.

SMALL FARMS.

The big estates have been made attractive through the expenditure of a lot of money. In comparison, the small farms are equally unattractive. In the Province of Buenos Aires and in the southern part of the Province of Santa Fe, and to a certain extent in parts of Cordoba, there are many attractive small places, mostly fashioned after the big ones, where the people are at least comfortable. There are thousands of places, however, ranging in size from 600 to 2,000 or 2,500 acres, where there is hardly a single attraction worthy of the name. Reference is made to great tracts of land in the grain belt which are mostly worked on shares by tenant farmers.

"Shack" is the only term which will fittingly describe the dwelling house of the farmer and his family. This is sometimes of mud and straw, but more often of corrugated iron nailed to a framework of wood, with low ceilings, no floor save the bare ground, and only little doorlike windows, if there are any at all, which do not have any glass and which when closed exclude both light and air. Crude as the building is, its furnishings are even more so. A long rough table or two, with several wooden benches of equal length, serve for dining tables and chairs. Sometimes there is a bed or two, more often only one, with a number of individual canvas cots. Cooking for the most part is done in the open air, alongside the house, on charcoal braziers. Few people find time to plant trees or flowers. In the summer time the sun beats down on the low roofs of the houses, adding to the discomfort of the inhabitants, while innumerable insects of every description dispute the right of domicile with the occupants. On one of these farms there is nearly always a well, with a windmill, near the house, a shed for chickens, and sometimes a shed for small tools. There are no barns or granaries. Implements stand out of doors the year round. The animals run loose in the pasture in the daytime, when they are not required for work on the farm, and are kept in large corrals at night or allowed to graze at will.

Nothing could be more monotonous than the life the small farmers lead, yet many of them are gradually acquiring economic independence, and the day is not far distant when, conditions having improved over the vast expanse of territory which they now inhabit, they will be a power in the land. The small farms, as a rule, are devoted to agriculture. Only a few cows are kept for their milk, from which cheese is made, and a few sheep and chickens are raised and form the principal articles of food.

METHODS OF CULTIVATION.

Only in recent years has any great part of the vast agricultural area been cultivated in a careful manner. In the early days tillers of the soil were possessed with one idea, that of getting everything they could out of the soil without putting anything back, or even carefully cultivating it to preserve in some measure its original fertility. If after four or five seasons a tract of land failed to yield what the farmer thought it ought to produce, he simply abandoned it and looked for another plot, there to pursue the same methods. There was plenty of land, with few to work it, and it was of little consequence how it was worked.

The gradual settling up of the country, the rapid rise in land values, and the increase in rentals has been slowly but surely changing all this. In the grain-growing districts the land is now carefully plowed and harrowed, generally speaking, and the crops are put in and cultivated in much the same manner as in the United States. Rotation of crops is practiced to some extent and within a few years will have to assume greater proportions.

One of the greatest drawbacks is that too little attention has been given to the eradication of weeds. A very temperate climate favors the growth of all kinds of weeds found in Illinois, Iowa, and most of the Central States. Canadian thistle and wild mustard are found everywhere, and very little systematic effort has been made to exterminate them. It is a well-known fact that Canadian thistle can not be destroyed unless the roots are dug up and exposed to the hot sun. In Argentina machines like huge land rollers provided with knives are run over the thistles, but as they only cut the plant above the surface and do not disturb the roots they are not very effective.

Deep plowing is not practiced in any part of the grain-growing districts, and the average depth to which the land is plowed is between 4 and 5 inches. Naturally, in the extreme north in the subtropical districts deeper plowing is practiced. In that zone many of the farms were once covered with timber, and as there are great numbers of stumps and roots in the fields, only light walking plows and heavy disk plows are used. Hand cultivation is not practiced anywhere, save in vineyards and truck gardens and in the cane fields of the north.

FUTURE EXPANSION OF AGRICULTURE.

The vast territory of the Argentine furnishes neither coal nor water power for industrial purposes except in a few isolated localities. The early settlers turned to agriculture and stock raising and their descendants have followed in the same path. Immigrants coming from Europe, owing to the demand for agricultural laborers, have never sought to gain a livelihood except as farm laborers or small farmers. Many young men from the rural districts, having received the benefits of a good education, as in this country, are leaving the farms to engage in commercial work or in the professions in the cities, but their places are more than filled by those who remain and by new immigration.

The great fertile country is going to continue to draw settlers from Europe, and even though its progress is retarded for a time, it is destined to become the world's greatest Spanish-speaking country. It is doubtful if anything will take place which will

greatly change its character. It is an agricultural and pastoral country; its people of European origin naturally turn to agriculture; and slavery, never having been permitted to gain a foothold, has not filled the country with a negro population as is the case in Brazil, and therefore there is no racial problem to solve.

PRINCIPAL CROPS RAISED.

Corn, wheat, linseed, alfalfa, and oats are the principal crops raised. Land destined to corn is plowed during the late fall and winter, May and June, and planting commences in August and is continued through September and in some districts into October. Corn is drilled in with three-row drills in rows 27 to 30 inches apart. After the corn is up it is cultivated twice and then laid by. Harvesting begins in March and continues for several months.

Corn is husked and sacked in the fields and then hauled to a point near the farmhouse, where it is put in well-ventilated "trojas" to dry out and await the coming of the sheller. There are no permanent corn cribs, as in the United States. A "troja" is made by placing a number of poles in the ground in the form of a circle about 15 to 20 feet in diameter. Around the posts wire is strung and into the wire cornstalks are woven to keep the ears of corn from pushing out through the wire. The "trojas" are generally not more than 20 or 25 feet high. On one side of this improvised crib a pole some 8 or 10 feet higher than the crib is set. To the top of this pole a heavy wire is secured, which crosses the crib and is fastened to another much shorter pole some 50 feet away. The wire forms a track over which a large dump bucket may be operated. When loads of husked corn come in from the fields the corn is placed in the bucket, which is run up the wire by a single horse, much like a hayfork is operated. When the bucket with its load of corn arrives over the center of the crib, a trip releases the bucket and the corn is deposited in the crib. Oftentimes the cribs, when full, are covered with a corrugated iron roof to keep out rains and heavy dews. These cribs are certainly inexpensive and serve the purpose, as they are well ventilated. The farmer dose not keep his corn, but has it shelled and sacked in 220-pound sacks and takes it to town for immediate sale.

Wheat in most parts of the country is drilled in with drills having 6 or 7 inch spacing. Broadcast sowers are also much used. Planting begins in some northern districts as early as April and continues through the winter months, from north to south, until August. Harvesting begins late in November in the north and continues through December and January in the south. In parts of the country where grain does not ripen too rapidly and where there is not much danger of its shelling out by reason of high winds, small grain is cut with 12-foot headers and elevated into a rack placed on a wagon driven alongside the header. Grain cut in this manner is immediately stacked. Eight-foot grain binders are used in the Province of Entre Rios and in parts of the Province of Buenos Aires. Twelve-foot header binders are used in nearly every part of the country except Entre Rios. Grain cut with 8-foot binders is usually shocked before being stacked. Some farmers thrash from the shock, as in the United States.

The stacks of grain in Argentina are very different from those in most parts of the United States; they are long and rectangular at the

base, with the upper parts finished off in the shape of a gable roof. Thrashing begins in December and continues for several months. All grain is sacked at the thrashing machine in sacks holding about 220 pounds. It is then taken to the sheds at the nearest railway station or piled in the open and covered with great tarpaulins as soon as possible after thrashing. There are no granaries on the farms and only enough wheat is kept for seed the following year. Other small grains are sown, cultivated, and harvested in much the same manner.

Alfalfa is sown in March after the early fall rains, or in the spring; it is generally conceded that the early fall planting produces the best results. Alfalfa, when cut for hay, is stacked in the open; hay barns do not exist. When used as cattle feed, it is fed from the stack; for market, it is baled in 220-pound bales for home consumption, and in 14 by 18 or 16 by 18 inch bales if for export.

There are no elevators at the railway stations throughout the country. Storage is provided only for grain in sacks. All grain is transported in sacks to the terminal elevators in Buenos Aires or to steamers in other ports. Grain elevators are much needed throughout the country, and their establishment has been sanctioned by act of Congress.

POSSIBLE NEW CROPS.

Thousands of acres of land within the Republic are specially adapted for rice and cotton growing, the latter in particular. It has been estimated that there is an area of land adapted to cotton growing greater than that of the cotton districts of our Southern States. Production, however, has been spasmodic. The land best suited to cotton growing is in the extreme northern part of the country, where there is only a scanty population and poor means of communication.

The development of rice culture is being carried on by a Japanese, under direction of the Ministry of Agriculture. In 1914 the total area devoted to rice culture was in the neighborhood of 3,800 acres. The product finds a ready sale in the country and great quantities are imported.

STOCK RAISING.

When the early settlers arrived in the country they found an immense prairie covered with luxuriant native grasses which had never been pastured to horses or cattle, as the few native Indians had none of these animals. Cattle and horses and sheep were brought from Europe. Many of the former escaped to the boundless open plains and laid the foundation for the extensive herds of cattle and horses now found in all parts of the country. For many years cattle were herded on the plains as in our own Western States. Little or no attention was given to improving the stock. As the country became more settled, land was taken up in large tracts by individual owners and fenced. Cattle no longer grazed over the open plains, and gradually, through the importation of pedigreed stock, the quality of the native stock of Spanish origin was improved.

Stock raising has gone ahead by leaps and bounds, and it is estimated that there are now more than 30,000,000 head of cattle, 80,000,000 head of sheep, and 8,000,000 head of horses in the Repub-

lic. The figures were given out by the Government, but no official census has been published since 1908. The total value of live stock in 1915 is estimated at $780,000,000. Cattle and sheep ranches, as a rule, are very large. As the country becomes more and more settled the older ranches are converted into cultivated farms, and stock ranches go farther and farther out toward the south and west and northwest. The development of the industry has proceeded apace, but its limits have not been reached by any means. The large ranches are well fenced and are divided into fields by cross fences. In each field there is generally one or more windmills to supply water, which is pumped into huge corrugated iron tanks, set low and surrounded by a strong bank of earth for support.

Sheep are raised in nearly all parts of the Republic, and mutton is highly prized as an article of food. Practically all of the wool is exported, France being the heaviest purchaser. Shearing begins in October, and the average clip per sheep is about 5.34 pounds. Seventy-five per cent of the wool is of white-faced, long-wool sheep, 20 per cent merino, and 5 per cent of black-faced and native sheep.

Exports of wool in recent years were as follows:

Exported to—	1911	1912	1913	1914
	Tons.	*Tons.*	*Tons.*	*Tons.*
France	51,501	51,138	31,342	23,794
Germany	31,693	47,839	41,362	30,386
United Kingdom	19,807	24,744	21,780	26,849
Belgium	13,205	14,846	10,580	17,100
United States	7,923	16,496	9,314	8,788
Italy	2,335	3,299	2,360	6,835
Other countries	5,572	6,602	3,342	3,473
Total	132,056	164,964	120,080	117,270

The shipments were valued at $50,494,027 in 1911; $58,148,664 in 1912; $45,270,016 in 1913; and $46,967,658 in 1914. The shipments in 1915 are estimated at $55,579,000.

Wool is exported in large bales bound with iron straps. The straps were largely imported from England prior to the war, but now several houses in Buenos Aires are making arrangements to buy their stocks in the United States.

III. DETAILS OF THE MARKET.

Simultaneously with the development of the agricultural resources of the country on a large scale came the demand for modern labor-saving farm implements and machinery. From a very small beginning more than 35 years ago, many of the houses which started importing implements have grown into great institutions, known in all parts of the country and having agents and representatives wherever the soil is tilled.

Agricultural conditions and the nature of the crops grown have at all times favored the use of American implements and machinery. The importing houses, with the assistance of factory representatives and, in many cases, a considerable number of technical experts from the various experimental departments, have carefully developed the many different lines, adapting them to suit local requirements in all sections of the country. To accomplish this has required an immense amount of work and the expenditure of thousands of dollars.

The average annual value of implements and farm machinery, including kindred lines and spare parts, imported into Argentina from the United States is in the neighborhood of $11,000,000 annually and represents between 20 and 25 per cent of our total exports to Argentina and 5 per cent of Argentina's total imports. During the past three years there has been a heavy decline in some lines through various causes. During the days of the first Balkan war European capital was withdrawn from the markets of the world, and great sums which had been available for investment in Argentina could no longer be had.

In 1912 there were crop failures in many large districts, succeeded by only a fair crop in 1913. Heavy rains early in 1914 delayed the handling of the corn crop, the marketing of which at the proper time would have had a tendency to make general trading easier. There had been almost unwarranted speculation in land and city property, and real estate values went down more rapidly than they had risen. With the commencement of the present war in Europe, new capital not being forthcoming, general trading came to a standstill, hundreds of failures were reported everywhere, and the situation was indeed serious. The Government adopted measures which have been gradually strengthening the situation and point to a quick return to normal conditions.

In some districts, when the crops failed the tenant farmers abandoned everything. This, of course, had an immediate effect on the houses importing implements and machinery. Farmers in other districts did not buy new implements with anything like their accustomed readiness to do so, hence importations declined. Stocks are now low in nearly all lines and, given present conditions, if it were not for the very high ocean freight rates, it is certain that a large increase over the importations for the past three years would be recorded. It is the consensus of opinion that importing houses will order sparingly until the freight situation changes.

COUNTRIES SUPPLYING IMPLEMENTS AND MACHINERY.

Large numbers of English thrashers and cylinder corn shellers have always found and still find acceptance in Argentina. In the former line American manufacturers are getting an increasing portion every year. In the cylinder sheller line, however, very little progress has been made by American manufacturers. It is a line which presents great possibilities, as there is a very large area under corn, nearly all of which is exported and therefore must be shelled.

There is competition from Canada in plows and harvesting machinery and from Australia in harvester thrashers; otherwise the great bulk of the business goes to American manufacturers. Contrary to the opinion so often expressed, this volume of business did not come to American manufacturers without serious effort on their part; just the reverse is the case.

The firms that now supply any considerable portion of the great amount of machinery sold to importers in Argentina have spent large sums of money in developing the business, in changing the construction of their goods, and in employing salesmen and experts to assist jobbers in selling and demonstrating their individual lines. The salesmen and experts have worked hard, oftentimes night and day and Sundays, under living conditions not now paralleled in any part of the United States. With the gradual settling up of the country more and better hotels are being established and conditions are rapidly improving. There is, however, even now much room for improvement in the smaller towns and cities of the interior.

PACKING AND MARKING.

Implements and farm machines in general must always be packed separately, one complete machine to a case, or several of them, depending largely on the implement or machine. The idea is to pack the machine so it will occupy the smallest possible space, yet in a way which will enable one or more machines to be separated from a shipment without great difficulty. Cases and crates must be strong and well made, and should be bound with flat iron straps. Top and bottom boards on cases containing knocked-down implements should run crosswise of the case, never lengthwise. Lumber used in cases should be as dry as it is possible to obtain. Cases are usually stored deep in the hold of the ship for transportation, where the heat from the furnaces quickly dries out the lumber, and if wet or green lumber has been used, it draws out the nails to such an extent that they will not hold, which often results in considerable expense to put the cases in shape for further transportation inland.

On several occasions shipments of implements have arrived in Buenos Aires in such a condition that the separate parts had to be shoveled out of the hold of the ship. The reason for this was that green lumber had been used in the cases, and the heat from the boilers having dried out the lumber caused the nails to loosen; consequently, when it was necessary to hoist the boxes out of the hold of the ship they gave way, scattering the parts in all directions. On other occasions the same thing has happened when the top and bottom boards of the cases were nailed on lengthwise. The weight of the material against the long boards was too great and they gave way.

MARKINGS ON CASES.

In nearly every instance manufacturers are given specific instructions regarding marks which should appear on cases. In the absence of these instructions any suitable mark may be used. A mark made up of a design like a square or diamond containing the initials of the consignee is very acceptable. Cases should be marked on two adjacent sides with the shipping mark of the consignee, net and gross weights in pounds and kilos, the dimensions of the case, and the cubic contents of same. A serial number should appear on every case or they should be numbered consecutively, or both. Letters and figures must not be less than 2 inches high. Marks, weights, measurements, etc., should be stenciled on the cases in ink. Weights and measurements shown must be accurate, as most foreign customs authorities where duties are assessed on a weight basis assume that there has been intent to defraud when these are not correct. In any event, if correct weights and measurements are not given, goods will be delayed until an investigation determines the cause and until the error is rectified.

A very convenient way of numbering cases and crates has been adopted by several large manufacurers at the request of their Argentine agents. Supposing, by way of an example, that an Argentine importing house is buying implements from a number of manufacturers. When the goods arrive from the different factories they often have to be stored in warehouses for a considerable time. It is likely that many cases containing different implements or parts of complete implements will be similar in appearance. Therefore, some distinguishing mark is needed to save time in separating the cases as they come from the steamer to the warehouse and again when they are sent into the country. For this purpose serial numbers are used in addition to all other marks previously referred to. An importing house receives disk harrows from Jones & Co. and disk drills from Smith & Co. In that case Jones & Co. are instructed to letter all cases and crates "J," which immediately serves to indicate from what factory the goods have been received. In addition Jones & Co. have been advised that No. 446 represents an 8-foot disk harrow with certain specified equipment, less main evener bars and poles; No. 447 represents a crate containing 10 main evener bars; No. 448 a crate containing 5 main evener bars; No. 449 a crate containing 10 poles; No. 450 a crate containing 5 poles. Then in a shipment from Jones & Co., where a case is marked J446 the warehouseman instantly knows he has a disk harrow, 8-foot size, less main evener bar and pole. If he has to ship out the harrow he simply sends one case J446, one pole from crate J449 or J450, and one main evener bar from crate J447 or J448. Likewise disk drills from Smith & Co. will be marked "S," but some other number will be used to distinguish between the different types of machines S340 might mean one size drill, S350 another size, and so on. Serial numbers of this kind when used should not be less than 5 inches high, stenciled in ink on two opposite sides of each case or crate.

Some firms even add another letter to the serial number, after the number, as J446A. The final letter is to determine the year in which the goods are purchased. In the foregoing combination, if "A" is taken to represent the year 1916, then J446A appearing on a case

instantly informs the warehouseman that the case contains a Jones & Co. 8-foot disk harrow, less main evener bar and pole, season 1916. For subsequent years other final letters may be used in alphabetical sequence.

DIRECTION SHEETS AND REPAIR LISTS.

Something of great importance which is often overlooked by the manufacturer is the furnishing of direction sheets and repair lists in the Spanish language. Implements, when prepared for export shipment, must be pretty well knocked down to economize on freight. They not only arrive in Buenos Aires or other ports in that condition but are also sent to destination in the country in the original cases. The farmers, as a rule, know very little about mechanics, even in the most elementary form, and in order to set up or assemble the implement they must have directions for doing so written in Spanish and illustrated with cuts. The direction sheet or catalogue should also contain a list of every part entering into the construction of the implement, together with a description of each part in Spanish, and a cut of each part with its respective number. These direction sheets should go into every case containing a complete implement. If any changes in construction are made the direction sheets should show the new parts. At the present time, packing troubles having largely been overcome, there is more complaint from Buenos Aires importers regarding the lack of attention given to direction sheets than on any other single point.

PLOWS.

All ground destined for crops must first be plowed. Therefore it is only natural to give information regarding plows first, especially considering that these implements are in great demand in Argentina, and perhaps differ in more points of construction from similar implements sold in the United States than any other implement or farm machine. The types in use at the present time, especially sulky and gang plows, are the result of many years' careful study of Argentine requirements. The different types were slowly developed by men of wide experience, and it is safe to predict that no very great changes will have to be contemplated for many years to come. A sturdy light construction, with great attention to neatness of design and finish, is essential. Only right-hand plows are sold in this market. Steel construction, wherever possible, is greatly to be desired for any implement destined for sale in Argentina. This is particularly true in plow construction and wherever possible the use of castings should be avoided.

GANG PLOWS, MOLDBOARD TYPE.

The greatest demand is for two-bottom gang plows to which a third beam and bottom may easily be attached. In considering points of difference in the construction of gang plows used in Argentina and those in the United States, attention is attracted to the high beaming and greater fore-and-aft clearance of the former. Gang plows for Argentina should have not less than 19 inches clearance under the beams along a line drawn horizontally from the point of the share to the underside of the beam; 20 inches is better. The distance, measured in a straight line from the front beam to the rear beam,

should be 22 or 23 inches, the measurement being taken just above the point where the tops of the moldboards leave the beam. The distance between second and third beams, when the latter are used, should of course be the same. Aside from these differences, and considering for the moment only the heavy type of gang plows having 14-inch bottoms, the following points should be observed: Front and rear beam braces are adjustable, not solid as in the United States. The reason for this is that farmers often want to open up the plow so that each 14-inch bottom will be spaced to take 15 inches. This arrangement is particularly desirable for plowing a second time and when a corn-planter attachment is used. In dry weather, when the ground is hard, it is often desirable to narrow the cut of each bottom by 1 inch to lighten the work of the horses. Therefore beam braces, which must be strong, should be so made that a gang plow equipped with 14-inch bottoms can be set so each bottom will take 13, 14, or 15 inches of land.

Wheels.—The land wheel of the plow must be higher and stronger than that generally employed in the United States. The front furrow wheel must also be stronger. Solid pressed steel rear wheels are the most acceptable, as there is generally an abundance of long straw and weeds in stubble fields which have a tendency to wind into open rear wheels and affect the proper working of the plow. The rear wheel should be set so as to run in the corner of the furrow, next to the furrow wall, and not in the center of the furrow. All wheels must be provided with good boxings and sand collars and caps. Much attention should be given to the construction of the collars and caps, as the soil in most places has a large amount of sand.

Axles.—The most desirable cross-axle construction is a one-piece square pipe axle, which must be securely fastened to steel clamps. The steel clamps must be arranged so that the cross axle will pass over and not under the beams. The reason for this is that great clearance must be provided for turning under cornstalks, which are seldom pastured off. The clamps should be secured to the beams by hot riveting. Two parallel bars are often used in the same manner for cross axles, but they must be made strong and secured to the beams in such a manner that they can not get loose, or they will not be as acceptable to the Argentine farmer as the square pipe axle. The furrow-wheel axle should be at least one-eighth of an inch greater in diameter than that generally used in this country. Land and rear wheel axles need no special construction. The up-and-down range of the furrow axle must not be less than 7 inches, for, while the Argentine farmer does not want a high lift plow, he wants plenty of clearance under the bottom when the plow is lifted for transport.

Ratchets.—Malleable or steel ratchets should be firmly secured to both ends of the cross axle and should have notches from $\frac{7}{8}$ to 1 inch deep. Land to be plowed is generally more or less rough and lumpy and unless deep notches are provided in the ratchets the levers will fly out of place when the plow is at work, causing much annoyance to the plowman and often resulting in expensive breakages and in delays.

Springs.—A long heavy spring should be furnished for the lifting or furrow lever, and a heavy cushion spring for the land lever. Springs for holding lever dogs in place should come in for a great deal

of attention on account of the tendency of the levers to fly out of place when the plow is working in rough ground.

Hitch.—Any complicated form of hitch control, or construction having a tendency to automatically guide the plow, by directing the animals hitched to it, however desirable it may be when properly adjusted, should be religiously avoided, as it is a source of trouble and often results in the condemnation of a perfectly good plow. In view of the fact that gang plows for Argentina must be adjustable to different cuts, as has already been explained, and owing to the fact that horses used are almost never trained plow horses, a simple angle-iron or similar clevis should be provided, so that the entire hitch can be easily shifted from left to right or vice versa. All hitch and clevis parts should be strongly built of steel, as steel six-horse abreast eveners are used and this size of evener is heavy. The vertical clevis should be so constructed that it will support the evener clevis in a horizontal position parallel to the surface of the ground. The evener should never be permitted to touch or drag on the ground. Six-horse abreast steel eveners with 28-inch singletrees have been in demand, but there is a tendency to widen the singletrees to 29 or 30 inches, the latter size being more commonly employed in this country.

Seat and spring.—A comfortable pressed-steel seat and a good seat spring are required on all gang plows.

Bottoms.—Hardened soft-center steel moldboards and crucible-steel shares are in demand in Argentina. There is no condition requiring a hardened soft-center steel share. One extra crucible share must be furnished for each bottom and all extra shares must come from the factory with the proper bolts with ground heads. The frame or frog of the plow bottom should be of pressed steel. A short landside for the front bottom and long landsides for the rear bottoms are required on all two and three bottom gang plows.

Except in the Province of Entre Rios, there are no difficult scouring soils in Argentina where the areas under cultivation require the use of either sulky or gang moldboard plows. In the Province of Entre Rios a rather long, slow-turning, stubble moldboard must be used. In other parts of the Republic shorter quick-turning stubble moldboards can be used, whether for plowing stubble or breaking new land. Prairie breakers are never used. The stubble bottom efficiently handles any of the work to be done. The two types of moldboards should be interchangeable on one bottom.

Rolling colters.—For some years the demand has been for large rolling colters. Eighteen-inch colters have been the most popular, but there is a tendency in many parts of the country to use full-cut 16-inch rolling colters. Colters must be adjustable up and down and laterally. Owing to the sandy condition of the soil and the disregard for lubricating oil, long chilled bearings revolving about a tempered steel bolt should be furnished. The bearing should be a one-piece bearing the length of the distance between the outer edges of the colter hubs. A two-piece bearing is not acceptable, nor will it wear more than about a week, no matter what material enters into its construction. Adjustable C. R. C. clamps are a necessary part of the rolling-colter equipment. Jointers are not used in Argentina. The average yearly sale of a plow of this type is between 20,000 and 22,000.

LIGHT GANG PLOWS.

In addition to the heavy type of gang plows just described, there is a demand for a lighter gang plow of similar construction throughout, the sale of which reaches more than 2,500 plows a year. The light gang plow has 12-inch in place of 14-inch bottoms and is usually furnished without an evener, although the hitch is provided so an evener can be used if necessary or desirable. Rolling colters are often supplied in the 13-inch size; the full-cut 16-inch colter is more popular.

In every other respect save one the remarks regarding heavy gang plows will apply to the light plow. The one exception is the bottoms; the moldboards as well as the shares should be of crucible steel and may be of lighter stock than that ordinarily employed in regular plow bottoms. The spacing distances should be 10, 12, and 14 inches.

At one time there was a demand for a light walking gang plow, but its place has now been taken by the riding plow.

SULKY PLOWS.

In sulky plows the demand is for 16 and 18 inch plows. Of the 16-inch sulky plows from 12,000 to 15,000 are sold annually. The 18-inch size is not nearly so popular and total sales will range between 2,000 and 3,000 plows. In sulky plows for Argentina the manufacturer should seek light but sturdy construction. Particular attention must be given to the construction of long, sand-proof wheel boxes.

Wheels.—Heavy land and front furrow wheels must be provided. Nothing is a source of so much annoyance to the farmer as the breaking of a wheel, nor will anything condemn a plow quicker. On account of the space they occupy, the transportation of wheels is very expensive and by the time they reach a farmer in the interior spare wheels are very high in price. Rear wheels, except on plows destined for the Province of Entre Rios, should be of solid pressed steel and no scraper is required. On plows destined for Entre Rios, where the soil is somewhat waxy, open rear wheels with scrapers should be supplied. Rear wheels must run in the corner of the furrow next to the furrow wall, never in the center of the furrow.

Axles.—The front furrow wheel axle must be somewhat heavier than that usually employed in this country. The up-and-down range should be not less than 3 inches more than is ordinarily required for the domestic trade. In order to give the plow plenty of clearance when working in cornstalks, which are seldom pastured off, the cross axle should be placed over the beam and not under it. It should be long enough so it can be extended several inches to the right when the plow is used with a corn-planter attachment. The method of securing the cross axle to the beam should be carefully studied and its supports riveted in place on the beam by means of hot rivets.

Levers and springs.—A simple landing lever for controlling the front furrow wheel, constructed without any adjustments, is all that is needed to give the operator complete control of the width of cut under all conditions. It is generally conceded that flexible rod or pipe connections between both furrow wheels and the hitch, however desirable they may be where their purpose is thoroughly understood, will only lead to trouble if used in the construction of Argentine plows.

The lifting lever on sulky plows should be long, and a heavy lifting spring is a very desirable feature to aid the operator in lifting the plow out of the ground when plowing in meadows or old alfalfa land. The land lever requires no special construction, but it must be supplied with a good cushion spring. Levers to raise the rear end of moldboard plows out of the ground are used by some manufacturers, but are not necessary, especially if an automatic locking and unlocking rear wheel is used. Dog springs must be strong and should be covered so that inclement weather will not too soon require them to be replaced.

Ratchets.—The generally uneven condition of the ground and the necessity of plowing across corn ridges requires most careful attention to the construction of ratchets. The notches in land and furrow ratchets must be from three-fourths to seven-eighths of an inch, or even 1 inch, deep.

Hitch.—Four-horse abreast steel eveners are generally used on sulky plows. Dial clevises are not popular and should be avoided. An angle-iron clevis of steel having a wide range of adjustment to right or left is essential. The vertical clevis should be so constructed that it will hold the evener clevis horizontally and parallel to the ground at all times. Eveners when attached to the plow should never hang down or touch or drag on the ground. Even when the plow is at rest the evener should remain in a horizontal position parallel to the ground.

Rolling colters.—Adjustable circular rolling colters are a part of the equipment of every sulky plow. Jointers are never used. Rolling colters are used in two sizes, full-cut 16-inch and 18-inch. The $15\frac{1}{4}$-inch blade, termed 16-inch in the United States, is not large enough.

American manufacturers, with one or two exceptions, have not given enough attention to the construction of rolling-colter hubs, bushings, and yokes. Malleable yokes having steel washers in the two ends where they take the hubs of the blade, with the washers placed one in each side of the yoke, so the hub wears against the steel surface of the washer instead of against the ends of the yoke, will give the best results. The hubs on the blade may be of malleable iron, but should be constructed so that a long one-piece chilled bearing, like that described for use with gang plows, may be used. Small cone-shaped bushings, or any other type not having a bearing surface equal to the distance between the outer edges of the hubs, no matter what is claimed for them where farmers know how to adjust them and take up the wear, will not give good results. The colter shanks or stems should be strong, fastened to the beam by means of an adjustable clamp, and should have a wide range of lateral as well up-and-down adjustment.

Bottoms.—The stubble bottom is the only type of bottom required in Argentina. Two different moldboards must be supplied interchangeable on one bottom. For all districts except the Province of Entre Rios, a short, quick-turning stubble bottom answers every purpose; for Entre Rios a somewhat longer, slower-turning bottom is required, as the soil, especially when damp from dews or rains, is quite waxy. Old-ground, prairie-breaker, rod, or slat bottoms are not required. There is no condition requiring a hardened soft-center steel share; a crucible-steel share answers every purpose. One extra

share for each bottom is a part of the regular equipment of every plow.

Pole attachment.—There can be no set rule regarding poles and pole attachments; they are as often furnished as not. In designing sulky or gang plows of the moldboard type manufacturers should take this into consideration and be prepared to supply poles or pole attachments if called for.

General remarks.—Heavy sulky plows with 18-inch bottoms are nearly always used for planting corn and should be constructed with an extended furrow axle so the plow can be opened up for planting corn. The 18-inch plow should have a heavier beam than the 16-inch plow and is nearly always used with 18-inch circular rolling colters. The pole attachment is rarely used on 18-inch plows.

CORN-PLANTER ATTACHMENTS.

Corn-planter attachments for sulky and gang plows are in great demand in many districts in Argentina. They are never required to be packed in the cases containing plows and should be packed separately in cases containing five complete attachments. A manufacturer supplying both sulky and gang plows of the moldboard type and disk plows should use one planter attachment for all moldboard plows and another for all disk plows. The plate equipment should consist of four plates for drilling in corn—one three-hole, one four-hole, one five-hole, and one blank plate. In each seed can must be placed a Spanish direction sheet and repair list, showing in detail how to apply the attachment to the plow and containing a description list of the parts and cuts of the repair parts with their respective numbers.

WALKING PLOWS.

For vineyard and sugar-cane cultivation many wooden-beam plows in the 6, 7, and 8 inch sizes are used. These have a single wooden handle, gauge wheel, and one extra share each. Plows should be knocked down and packed five complete plows to a case. Some farmers in the vineyard districts, especially those who have worked land in the grain belt and are familiar with heavier plows of more modern construction, prefer steel-beam plows, with one steel handle, gauge wheel, and one extra share.

Aside from these very small walking plows, there is little demand for plows of that type, and total sales of all sizes up to 12 inches will probably not average more than 1,600 to 1,800 plows a year for the entire country. It is a class of business to which most of the large houses have given very little attention on account of the great and general demand for sulky and gang plows. Many hundreds of very cheap wooden-beam plows having cast-iron bottoms are sold every year. Sales of these plows are effected on a basis of so much per pound, and the large implement houses, except in one or two instances, care little or nothing for this class of business.

MIDDLE-BREAKER PLOWS.

Middle-breaker plows are not extensively used in Argentina, as most of the cultivation is on level ground. The greatest demand is for 8 and 10 inch sizes. Quite recently there has been a slight demand

for 16-inch middle breakers having a 14-inch share, with one extra share, gauge wheel, and moldboard extensions. These are used for making irrigation and drainage ditches.

DISK PLOWS.

Disk plows are in great demand in the southern, western, and northern parts of the Republic. In the southern part of the Province of Buenos Aires, in the small-grain district the land is generally plowed shortly after harvest and then sown to some forage crop which is used for green feed in the winter. Before putting in the next season's crop the land must be again plowed, and as the soil is light, a moldboard plow will not do the work as well as a disk plow. In the western parts of the country the soil is generally light and sandy and can be handled to better advantage with disk plows. In the north much of the land in cultivation is cut-over timber land, full of roots, and requires a good strong disk plow.

A manufacturer desiring a part of the disk-plow trade in Argentina will have to be in a position to furnish two types, a light plow and a heavy one. The light plow is required in one, two, and three disk sizes. The heavy type in one, two, three, and four disk sizes. Both friction sleeve and ball-bearing types have been supplied. The former is more desirable for light work, the latter for heavy work, particularly in the case of heavy four-disk plows, often used for power plowing.

Disk-plow equipment.—All disk plows, except in a few isolated cases, should be supplied with 24-inch disks. Two 70-pound wheel rims, which can easily be attached and as quickly detached—one for each of the furrow wheels—should be a part of the regular equipment of every disk plow. Single-disk plows should be equipped with three-horse steel eveners; double-disk plows with five-horse abreast steel eveners; triple disk plows with six-horse abreast steel eveners; and quadruple disk plows without eveners, as they are sold in small numbers, generally only for power plowing.

LIGHT DISK PLOWS.

Frame.—The frame of the light-type single-disk plow should be made so that it can be easily and quickly converted into a double or triple plow, or the triple plow made into either a double or single one.

Disk bearings.—Disk bearings must be attached to the frame so that they can be given either of two adjustments, one giving the disk a less vertical adjustment than the other, for work in different conditions of soil. Hard-oil grease cups should be used on all bearings and the cup should be situated so that when plowing in sod ground chunks of sod will not strike it as they leave the disk and either break off the cup entirely or turn off the cap.

Wheels and boxes.—Strong cast wheels having V-shaped rims are generally used. Boxes or bearings should be dust proof and large enough to contain sufficient grease for a long time.

Scrapers.—A very desirable scraper is one which will turn a part of the soil, like the moldboard on that type of plow. It should be adjustable, strongly built, and secured by a strong, adjustable clamp.

Levers and springs.—Levers should be strong and conveniently placed and of sufficient length to enable a rather light man to easily handle the plow.

Hitch.—A strong, simple hitch, the individual parts of which have great wearing qualities, is more desirable than a complicated hitch of more and lighter parts, even if the latter tends to make the implement more nearly automatic in its control.

LISTERS.

Some seven or eight years ago several large planters, after having heard of the good results obtained in the United States through the use of listers for corn planting, were induced to try a few machines in Argentina. The nature of the soil and lack of rainfall during some years in the districts in which they resided made the planting of large areas to corn very hazardous. If they got enough rain, they could count on a good crop; if they did not get enough rain, the efforts of a whole year were wasted and they suffered heavy losses.

The first year the machines were used there was an abundance of rain, and the benefits to be derived from the use of listers could not be fully ascertained. During the second season, however, a long drought laid waste many acres of corn on adjoining lands, while the planters who had used the listers and had decided to give them a thorough trial were rewarded with a heavy crop. One by one in different sections of the country farmers were induced to purchase listers and list their corn instead of planting it in the old way. Results, generally speaking, have been highly satisfactory, and during the 1915 season nearly 300 two-row listers were disposed of in addition to more than 100 single-row machines. Many more of the two-row machines could have been sold if it had been possible to get them from the United States in time. The trade will continue to grow.

Frame.—A high-frame, two-wheel machine leads in popularity at the present time. The frame, rigidly constructed, carries seat and spring, the seed cans, and the bails to which the plow bottoms and covering parts are attached. There are two levers, one for lifting the bottoms clear of the ground and automatically throwing the seeding mechanism out of gear, the other for tilting the plow bottoms. To the center of the frame two steel bars, which cross over the front member of the frame, are fastened and serve as a support for the evener. The bottoms are spaced to give an adjustment of 32 to 38 inches between rows.

Seed cans.—Cornfields in Argentina are large, and rows are therefore much longer than in the United States. The advisability of equipping listers with seed cans of twice the capacity of those used in the domestic trade will at once be appreciated. Seed corn is generally smaller than our own and smooth, which partly explains the demand for a flat drop. Seed cans are placed forward on the frame, the seat in the center on the rear member; thus the operator can see the seed as it falls and always knows that he is getting the amount required to insure a good stand.

Bottoms, boots, and coverers.—On the two-row lister 12-inch bottoms are used. Hardened soft-center steel moldboards and crucible shares are in demand, and one extra crucible share is furnished for each bottom. The bottoms are attached to beams, which are hung on bails independent of the frame. Moldboard extensions are supplied to keep loose ground from going over the tops of the moldboards. The seed boot is attached to the rear of the beam behind the bottoms,

and seed is carried down through spiral ribbon tubes from the seed cans. Disk coverers attached to the seed boot cover the grain to the desired depth, and press wheels attached to the main frame, two for each furrow, pack the soil around the seed. A good, serviceable root cutter for each bottom is a much-needed part of the equipment.

SINGLE-ROW LISTERS.

The three-wheel, single-row lister used in the United States has not required any changes in construction to make it suitable to Argentine conditions. Chain drive for the seeding mechanism is more popular than gears. Twelve-inch bottoms, with crucible share and one extra share, are part of the regular equipment of every lister. A machine having the seed cans forward of the seat, with flat drop and disk coverers, makes an instant appeal to the farmer requiring a single-row lister.

HARROWS.

DISK HARROWS.

The work of salesmen in Argentina in teaching agriculturists the benefits to be derived from the use of disk harrows has been in a high degree responsible for the ever-increasing demand for that implement.

Argentine disk harrows differ but little in points of construction from harrows used in the United States. Aside from the fact that a well-designed, strong, and highly flexible harrow will meet with approval in all sections of the country, there is one point meriting special attention, and that is the position of the seat. In many parts of the country the very rough condition of the ground, often very dry at the time when it must be disked, makes it difficult for the operator to keep his seat and properly manage the team and harrow. To overcome the tendency to tip forward and throw the operator from his seat. the stub pole should be carried well to the rear. With the seat and seat spring on the rear end of the stub pole, the operator will be behind the disk gangs, and in the event of being thrown from his seat he will not fall directly in front of the disks and endanger his life. Failure to observe the remarks with reference to the location of the seat will result in the condemnation of a disk harrow quicker than any other thing. Hard-oil grease cups are necessary on all disk harrows, and careful regard to their construction will claim the attention of farmers.

Disk harrows, the total sales of which are more than 2,000 harrows annually, are furnished in 4, 5, 6, 7, 8, 10, and 12 foot sizes. These different sizes are supplied with either 16, 18, or 20 inch disks. The round disk is more commonly used, but there is an occasional call for cut disks. The 4, 5, and 6 foot sizes are seldom equipped with weight boxes. All the other sizes require that attachment. Oscillating scrapers are a part of the regular equipment of Argentine disk harrows, and their construction deserves special attention, as seeders are frequently used on disk harrows for putting in oats and other small grain in the spring when the soil is very damp. For the purpose of breaking the middles between the gangs it is very desirable to furnish a double-pointed pin-break middle breaker with every disk harrow.

As a part of the regular equipment 4 and 5 foot harrows are supplied with two-horse eveners; 6-foot harrows with three-horse eveners; 7, 8, 10, and 12 foot harrows with four-horse eveners. Seven and eight foot harrows and larger sizes are almost always used with tongue trucks. Tongue trucks, as well as transport trucks, do not in any case form a part of the regular part of the equipment of disk harrows, but are supplied to the Argentine importers at an extra price.

REVERSIBLE DISK HARROWS.

For orchard and vineyard cultivation there is a limited demand for a high-frame, adjustable, and reversible disk harrow. This implement is also used in the cultivation of sugar cane in the northern Provinces. For a long time the most popular size was a six-disk 18-inch harrow, with combination pole and shafts. Extra disks and collars to convert the harrow into an eight-disk machine were always furnished. An eight-disk machine with 18-inch disks is now in demand, and it must come equipped with a pole two-horse evener.

SEEDERS FOR DISK HARROWS.

Force-feed broadcast seeders for 6, 7, and 8 foot disk harrows are quite popular in many sections of the country. Grass seeders for sowing alfalfa seed are sold in limited quantities in the same sizes. Agitator drills and seeder attachments in the 6, 7, and 8 foot sizes for harrows having either 16 or 20 inch disks are also in demand.

An item of special interest to most manufacturers and deserving of a great deal of attention is the construction of gang bars—that is, the connections between the levers and the gangs which through the levers actuate the gangs and enable the operator to give the latter any desired angle. Several of the large importing houses received complaints from country dealers that the gang bars were not strong enough, and that they frequently bent out of shape. An investigation to determine the cause clearly proved that, although the bars were strong enough, the manufacturer had constructed them in such a manner that they could be put on end for end, and that either end could be fastened to the end of the gang lever. The gang bars had a dip at one end, which was designed to be placed at a point near the gangs. If they happened to be placed wrong end to, the force exerted on the bars by moving the lever forward and rearward did not come in a direct line and had a tendency to bend the gang bars. When the gang bars were properly attached, with the curved ends next to the gangs, they were strong enough and no trouble resulted. Therefore, if the construction of the gang bars is such that they must be put on in a certain way to insure the proper working of the harrow, some means should be provided, like having a square hole in one end, so that in setting up the implement farmers can not make a mistake. Such trifling things as this often put an importer to great expense to rectify.

SPIKE-TOOTH HARROWS.

U-BAR HARROWS.

The most acceptable spike-tooth harrow in Argentina is a five-bar U-bar lever harrow. Longer and larger teeth are the only differences in construction to be observed with reference to similar

harrows in the United States. The teeth should be $\frac{5}{8}$ by $\frac{5}{8}$ by 10 inches, and must be firmly clamped to the bar of the harrow. Reversible teeth are not desirable for the reason that in general they can not be so firmly held in place, nor do they have the strength of the nonreversible type.

The most popular sizes are the two-section 50-tooth, two-section 60-tooth, two-section 70-tooth, three-section 75-tooth, and three-section 90-tooth harrows. They are always supplied with their respective eveners. For transportation harrows are usually crated five complete harrows, less eveners, to a crate. Eveners are crated in any convenient number, usually in lots of 5 or 10, depending on the size of a single shipment.

PIPE-BAR HARROWS.

Next in order of importance is the pipe-bar lever harrow. This harrow is required in two-section 50-tooth, two-section 70-tooth, and three-section 90-tooth sizes. Teeth should be $\frac{5}{8}$ by $\frac{5}{8}$ inch and from 8 to $8\frac{1}{2}$ inches long. Eveners must always be furnished. Packing the same as the U-bar type.

COMPETITION.

The only competition, except between houses selling American harrows, is from England. Chain harrows of English manufacture are sent to Argentina in small lots and sold at a price about 15 per cent higher than the price of the corresponding size of American spike-tooth harrow. Some harrows are made in local blacksmith shops and other small shops, but little importance is attached to their influence on the trade.

SEEDING MACHINERY.

GRAIN DRILLS.

About 1906 an extensive sales campaign for the sale of grain drills was inaugurated by large importing houses in Buenos Aires, and the lead was followed by houses of lesser importance in Rosario. This was one machine which the farmers had been slow in taking up, preferring to broadcast their crops or sow by hand. By selling a few grain drills in each important district the attention of the farmers was attracted to the neatness of the work and general evenness of the stand. The fact that seed was sown to a uniform depth and immediately covered, so that birds could not eat it, started a demand for different kinds of grain drills, which kept increasing by leaps and bounds until 1912.

In some years close to 5,000 grain drills were disposed of in Argentina. The unsettled condition in many parts of the country which has prevailed since 1912—partial crop failures in some districts for two or three successive years and the return of much land to stock raising as a result of the crop failures—all had an effect on the sale of grain drills, and since 1912 orders to the manufacturers, generally speaking, became smaller and smaller. It is generally conceded at this time (May) that stocks are low, although the season is just on and they are larger than will be the case several months hence. Some houses are entirely sold out of seeding machinery, while one or two have a

pretty fair carry-over. Figures can not be given, owing to the fact that one or two houses known to have quite a stock and to have ordered sparingly for several years will not make even a general statement.

General features.—Generally speaking, disk drills sold in the Argentine market have been supplied with a well-trussed square pipe frame. There is a tendency to make the machines lighter, and it has been stated that several manufacturers will design new angle-iron frames to take the place of those now used. Double-run feed is preferred in nearly all districts, but many fluted force-feed drills have been sold and will continue to be sold in the southern and western districts of the country.

The majority of the drills have single-disk openers, and much attention has been given to the construction of dust-proof disk bearings. Shoe drills are sold in two sizes only, 17 and 22 furrows. Hoe drills and double-disk drills are not popular. Grain drills are used only for small grain and alfalfa, therefore no attention need be given to the construction of a drill which will handle beans, corn, or other large seeds. Wide-tire wooden wheels, having large hubs with large hard-oil grease cups, are in general demand. Simple change-speed gear drives are essential to the success of a drill, and the parts must be combined in such a manner that they will not wear quickly or be easily broken. The construction of a very simple, thoroughly efficient, and long-life change-speed gear, next to a no-sag well-braced frame, is one of the points requiring the greatest attention in designing a drill for Argentina.

The grain hoppers should be so constructed that they can be used for sowing alfalfa by the simple addition of the proper size cups, introduced into one-half of the stationary seed cup, the other half being closed with a gate. Auxiliary hoppers for sowing alfalfa at the same time grain is sown should also be furnished when called for. In Argentina many tenants rent tracts of land for growing small grain for a period of five years. At the end of that time they are required to deliver the land, sown to alfalfa, to the owner; hence during the fifth season they will want to sow small grain and alfalfa at the same time.

Equipment.—The usual equipment consists of eveners of the proper size, spiral ribbon grain tubes, and covering chains. A large part of the drills sold have 6-inch feed, but some firms bring out only drills with 7-inch feed. In the main, houses confine themselves to either 6 or 7 inch feeds to simplify repair stocks. A comfortable seat is required on all drills.

The sizes in demand, in addition to the shoe drills mentioned above, are 14, 17, 20, 22, and 24, single-disk drills. There is not a market in Argentina for one-horse and fertilizer drills, nor is there anything but an occasional call for gang press wheel attachments.

BROADCAST SOWERS.

The total number of broadcast sowers for which there is an annual demand in Argentina is about 1,500. Only wide-track 14-inch force-feed sowers with steel wheels are now sold in large quantities. An auxiliary grass seeder for sowing alfalfa with grain is much in demand. Land measures and feed gauges must be in Spanish. Two-horse eveners and neck yokes are part of the regular equipment.

CORN PLANTERS.

The areas devoted to the cultivation of corn are very large. Most of the corn grown is exported, only a very small percentage remaining in the country. The acreage and production is gradually increasing and will continue to do so almost indefinitely.

In Argentina corn is drilled in with three-row disk drills having double-disk openers, in rows 26 to 30 inches apart. Until recently comparatively few farmers used the wide setting on their drills; the present tendency is to widen the planting to 30 inches, and in all probability within a year or two it will be increased to 32 inches. Corn grows to an average height of about 7 feet and the stalks are rather small in diameter. The majority of the stalks bear only one ear of corn, usually found about 3 or 4 feet above the ground. Often there will be two ears on a single stalk, the second ear almost always being found near the top of the stalk. More than two ears on one stalk is a very rare occurrence. Corn is planted during July, August, and September and is harvested during March, April, and May. Only a very small amount is handled with the husk on.

The most successful corn drill is a machine having a strong, well-built, angle-iron main frame supported on two wheels attached to a live axle. The frame must be well braced so it will not have a tendency to sag in the center. An auxiliary or jack shaft having a set of gears that are automatically thrown in mesh with a gear on the live axle by a single lever, which also lowers the openers to a working position, is a very desirable form of construction. The most popular drills of this type have 42-inch steel wheels with staggered spokes, long bearings, and a 4 or 5 inch concave rim. Flat-rim wheels must be avoided. Double-disk openers with knife coverers are held in high favor, but runner openers with press wheels are also in demand. Both types of furrow openers should be interchangeable on one drill. Knife coverers and press wheels must be provided with separate pressure springs and must be attached to the seed boot so they can rise or fall when passing over obstructions without raising the furrow opener at the same time.

Seed cans should be large, double the capacity of the cans usually furnished on planters in the United States. Each seed can must be provided with a small lever which will permit it to be raised off the drive gear and out of working position without stopping the machine. Fertilizer attachments are not required. The seat should be placed in such a position that the operator has the seeding mechanism in view at all times. Disk bearings must be dust proof, simple in construction, and easy to replace. The seed boot must not be carried to a point too low between the disks or it will strike lumps or clods of dirt and have a tendency to raise the furrow opener out of working position.

Two adjustable revolving disk markers must be supplied on each machine. The marker disks, provided with dust-proof bearings, should be attached to rods running into pipes, one of the pipes to be attached to the rear in each corner of the main frame by some suitable flexible connection. From the front corner of each side of the frame adjustable rods should be furnished to hold the disks to their work in a line parallel to the direction taken by the machine. It is necessary to attach a rope to each marker disk so as it can be raised inde-

pendently of the other from the seat of the machine. It is important that all disk bearings and axle bearings be furnished with suitable hard-oil grease cups.

Two-horse eveners are a part of the regular equipment of every machine. The poles must be provided with ox hitch, as oxen are often used in the corn districts. The ox hitch need consist of only two steel plates 12 inches long for top and bottom of the end of the pole, with a 1-inch steel rod passing through the end of the pole and projecting about 8 inches beyond it. The rod should be upset at a point about 4 inches from one end to provide a shoulder which will not permit it to pass more than that distance through the planter pole. The short end may be threaded or may have a cotter pin for the purpose of securing it to the pole. Plate equipment should consist of three sets of plates for rather small, smooth corn and three blank plates.

POTATO PLANTERS.

Potatoes are a much-prized article of food in Argentina, yet the cultivation of them has been neglected except in a few districts in the southeastern part of the Province of Buenos Aires. All farmers raise enough potatoes for their own use but very few of them raise any quantity for market. Potatoes are planted in hills about 20 to 24 inches apart, in rows about 30 inches apart. Most of the planting is done by hand; some farmers plant the whole potato and others cut them and plant only parts of potatoes. The demand for potato planters is very limited and the cup machine is preferred to the picker-type machine. Two of the most important houses in Buenos Aires report the sale of 50 to 75 machines a year, while others do not even try to sell the machine. As in many of our Southern States, very fine potatoes can be grown, but as a rule they will not keep long. Planting begins in August and harvesting in February and March.

CULTIVATORS.

In the great alfalfa fields disk harrows are widely used for cultivating. Next in importance is the $6\frac{1}{2}$-foot drag-bar cultivator, having 13 drag bars each carrying narrow, double-pointed, reversible shovels. In this machine the shovels are attached to independent drag bars, each supplied with a pressure spring. The drag bars are arranged so they have a lateral movement, which prevents the shovels from splitting the alfalfa crowns and causing decay. The wheels are 40 inches in diameter with concave tires. A two-horse evener and neck yoke are part of the regular equipment. A seeder attachment is often called for, so that new seed can be sown in parts of the field where the stand is not heavy enough.

This cultivator has been sold only in small lots in Argentina but is an implement which should be in the hands of every farmer who raises alfalfa. A more determined effort should be made to acquaint farmers with the value of the implement as an aid in killing weeds in alfalfa fields. For that purpose the machine has no equal, but comparatively few farmers have any idea of what it will accomplish. There is no doubt that many could be sold if the same attention were given to them as is given to the sale of other implements.

CORN CULTIVATORS.

Until recent years corn was extensively cultivated in Argentina with small walking plows or with middle-breaker plows, and results were far from satisfactory. Within the last six years the demand for a more efficient cultivator of greater capacity led importing houses and factory representatives to give considerable time and attention to the construction of a single-row cultivator. The cultivator of this type is called a two-row cultivator in Argentina for the reason that it straddles one row of corn and cultivates two middles; that is, the middle between the straddled row and the next row on each side of it. The most satisfactory machine is an adjustable arch, pivotal axle, riding cultivator. The seat should have an adjustable position close to the axle line so as to entirely eliminate complicated devices for balancing the weight of the operator against that of the tongue and the raising of the gangs or rigs against the tongue. A pendant hitch is a very desirable feature, as it enables the operator to adjust the draft to suit different soil conditions and in all cases to get it as close to the beam as possible.

Among the beams or rigs used by different manufacturers one type in particular is very popular in a large part of the corn belt. The rig is a square pipe beam carried straight back from its support to a position a little to the rear of the wheel of the cultivator. At this point the right beam is bent to the right and the left beam to the left, both being carried rearward and out to a point well to the rear of and outside the wheels of the cultivator. A strong shank and clamp for each beam, each carrying a crucible 18-inch sweep, is provided for cultivating the corn.

When the corn reaches a growth which makes unnecessary further cultivation for the purpose of killing weeds, the sweeps are removed and 8-inch middle breakers, with moldboard extensions and 10-inch crucible shares, are substituted. The middle breakers are required to take the same shank as the sweeps and are used for laying-by the corn. The middle-breaker bottoms should be adjustable, so as to enable the operator to give the bottoms more or less "suck" according to the soil. Each bottom must be provided with one extra 12-inch crucible share.

This type of machine has become so popular that efforts are being made to build a similar cultivator which will cultivate three middles at one time in place of only two. With the exception of a rear third wheel to carry the seat, the addition of another rig and bottom, a wider frame, and possibly a little heavier construction, the general construction and equipment of the new machine will be the same. With the old machine a pole and two-horse hitch were supplied. With the new machine a combination pole and shafts and a combination three or four horse hitch will be furnished. More than 3,500 cultivators of this type are annually sold in Argentina and the demand will increase from year to year.

Disk cultivators and walking cultivators are not sold, nor is there any demand for them. Cultivators known to the trade in the United States as two-row cultivators are not popular, though they have been introduced and efforts have been made to build up a demand for them.

SLED CULTIVATORS.

The light inexpensive sled cultivator is the most popular one for listed corn. In construction the machine does not differ in any way from the cultivator of this type generally sold throughout the United States. Weed knives, usually furnished at extra cost, are not required for the Argentine trade. Bearings should be dust and sand proof and runners should be made of well-seasoned wood which will not soon warp out of shape. The cultivator should be made in a manner which will permit of its being completely knocked down, even to the disk gangs, for packing five machines to a case. The disks should be taken apart and nested in order to save space.

On large estates single and even double row listed corn cultivators of more expensive construction are being purchased. The purchases of these more expensive machines are confined to estates where the practice of listing corn has been followed for several years. The number of these is not great, but is bound to grow rapidly.

SMALL CULTIVATORS.

In the vineyards, in some of the cane fields, and in a few of the truck gardens five and seven tooth cultivators are used. The number sold, relatively speaking, is very small in comparison with the number sold for the same purpose in similar areas in the United States. The most popular five-tooth cultivator is one equipped with expanding lever, gauge wheel, and horse-hoe attachment. Seven-tooth cultivators with the same equipment are also sold, and while only the American implement of this type is sold in quantities, the trade is unimportant.

HAY TOOLS.

Mowers are sold in large numbers by all importers of implements. A new mower recently brought out has some very novel features. To at once provide a mower suitable for use with either horses or oxen a new frame was designed which gives place for two different settings for the pole, one alongside the other. When the pole is used in one setting for horses the other setting is covered with a neatly designed and easily removable tool-box cover and oil-can holder. The recess in the frame provides the tool box proper. If the pole is moved to the other setting the first one can be used in a like manner for the tools and oil can.

Another feature which has been the object of much favorable comment by interested people in this country is a new drop-forged knife head. Both wood and steel pitmans are in use and are sold, but it is generally conceded that a well-seasoned wooden pitman gives better satisfaction than any other type. Mowers are regularly furnished with two knives. An adjustable, rotary, single-wheel tongue support equipped with a cushion spring is supplied at an extra price.

Mower sizes range from $3\frac{1}{2}$, $4\frac{1}{2}$, and 5 foot light type to $4\frac{1}{2}$, 5, 6, and 7 foot heavy type. Extra heavy sickle bars with one saw-edge knife are supplied on special orders for cutting heavy weeds like Canadian thistle, etc. It might be worth while to again draw the attention of the reader to the fact that very little hay of any kind, other than alfalfa, is raised.

Alfalfa grows rapidly and is thick and heavy. It often has to be cut in very hot weather, and unless ample lubrication is provided for all bearings there is a tendency to overheat. Any construction of the working parts which takes into consideration the fact that much of the alfalfa land is very gritty and sandy, and which provides against wear under those conditions, will claim more than ordinary attention.

HAY RAKES.

The popular rake in Argentina is the American self-dump rake, heavy enough and strong enough to handle alfalfa. Side-delivery rakes are not popular and the demand is very limited. The popular sizes are 8, 9, 10, and 12 foot sizes.

All of the features embodied in rakes in the United States are found in rakes supplied to the Argentine trade. Chief among these are the reversible stub axle, heavy release spring on the locking device, and heavy double-coil, oil-tempered, pencil-point teeth.

TEDDERS.

Tedders have been introduced and sold in Argentina, but the demand for them hardly warrants carrying a stock on hand.

STACKERS.

Generally speaking, hay, consisting mostly of alfalfa, is stacked out of doors. Only on the large estates, where particular attention is given to breeding fancy prize cattle, and very rarely even then, is hay stored in barns. At the present time alfalfa is generally cut with mowers, raked and cured in haycocks, and then hauled to the stack, where it is stacked by very simple stackers, often made on the farms. Many farmers do not use stackers, but build a stack as high as the alfalfa can be pitched from the ground or load. A platform is then built alongside the stack onto which alfalfa is pitched and from there again pitched onto the stack to complete it. Hay loaders are not used, but no doubt they will come into use for handling green alfalfa for silage purposes, as is explained under the heading, "Silos and silage cutters."

A stacker now on sale in the Argentine market and which has attracted considerable attention, owing to the fact that it was originally designed in that country and seems to meet every requirement, presents great possibilities if it could be made and sold at a lower price than is possible at the present time. The main frame is made of galvanized angle steel. The material is the same as that used in windmill-tower construction. The main frame, mounted on wheels for easy transport, is about 10 by 15 feet at the bottom. The tower rapidly narrows until there is a space not more than 1 foot square, some 20 to 24 feet above the ground. A main mast runs up through the center of the tower and is carried about 3 feet above it. The main mast has a set of bearings near its upper extremity which run on a track on top of the tower and permits the operator to swing the mast to any position in a complete circle. A boom is secured to the main mast above the tower and can be raised or lowered and swung around with the mast. A hay fork on the end of the boom takes care of the hay. With one horse hitched to the

end of a rope which runs up the main mast and follows the boom to the fork, a large quantity of hay can be easily and quickly raised, swung around to any position, and deposited on the stack. The stacker has a lifting capacity of 0.3 ton. The stacker is patented in Argentina and is now built by a prominent American windmill manufacturer.

HAY-BALING PRESSES.

Nearly every type of hay-baling press manufactured is sold in Argentina. Among them are horsepower, belt, and combined motor presses. The motor presses use gasoline as fuel. Belt-power presses are often operated by gasoline engines, but more often by steam thrashing engines. The latter are found in great numbers distributed all over the country, are both portable and traction types, and often, when no longer of service for heavy thrashers, are used to operate baling presses and other light machinery.

The 14 by 18 inch baling chamber is the most popular size. It is difficult to estimate the value of the Argentine market as to volume. Hay for export is always baled, but the crop varies considerably, depending on the amount of rainfall. In a dry year when pastures fail a much greater quantity is needed for home consumption than when there is plenty of rain and good pasturage.

Argentine statistics for the calendar year 1915 show that the total weight of hay-baling presses of all kinds imported was 162,641 pounds. This is smaller by 230,688 pounds than the total for 1914. The total weight rather than the number of units is given for the reason that duty is assessed on a weight basis.

Owing to the number of steam engines available, the demand is greater for belt presses than for motor presses. The only competition the manufacturer desiring to enter the trade would have would come from other American manufacturers.

HARVESTING MACHINERY.

The thousands upon thousands of acres of land yearly devoted to the cultivation of wheat, linseed, oats, and other small grains, the large size of individual holdings, and the scarcity of farm laborers have all contributed toward creating a big demand for harvesting machinery. American manufacturers supply over 90 per cent of the total importations of harvesting machinery and 99 per cent of the binder twine. Binders and header binders in small lots are imported from Canada, which, together with stripper harvesters from Australia, form the only foreign competition. Statistics compiled by the United States Department of Commerce show that the value of reapers and mowers exported to Argentina in recent fiscal years was as follows: 1911, $991,227; 1912, $2,259,821; 1913, $1,650,688; 1914, $1,102,499; 1915, $412,289. Exports of binder twine to Argentina in the same years were: 1911, 15,834,700 pounds; 1912, 27,884,581 pounds; 1913, 28,121,008 pounds; 1914, 13,632,648 pounds; 1915, 3,579,095 pounds.

In parts of the south and in the Province of Buenos Aires the demand is for 7 and 8 foot binders. In other parts of the south and in the west the 12-foot header is more commonly used. In general, the most popular machine is the 12-foot combined header binder.

BINDERS.

For many years the 8-foot left-hand binder was in great favor, but recently the right-hand machine has been introduced and extensively sold. Binders of 7 or 8 foot cut do not differ from similar machines sold in many parts of the United States. The 8-foot machine is the most popular and is regularly supplied with flax attachment or bundle carrier. No reduction in price is made if the machine is wanted without either of these attachments. Eight-foot machines are regularly supplied with tongue trucks and eveners, but without transport trucks, which are not required.

In packing for export the binder attachment is shipped in a strong crate strapped with iron, the bull wheel separately, without box or crate but with the hub protected by strips of wood; the poles are put in crates each containing 5 or 10 poles, depending on the number of machines shipped at one time; main evener bars also in crates containing 5 or 10; the bundle carrier in a separate box, and the rest of the machine knocked down in a strong well-strapped box.

COMMON HEADERS.

Common right-hand headers are furnished in the 12-foot size and are used extensively in districts where the grain does not ripen too rapidly or have a tendency to shell out too soon after it is ripe. These machines are regularly supplied with a long 8½-foot elevator or with a short elevator and flax attachment. When wanted with short elevator, but without flax attachment a reduction in price is made. At an extra price the machine is furnished with a folding 9-foot elevator and flax attachment, or with 9-foot folding elevator without flax attachment. Special long 10-foot elevators, 9-foot folding elevators convertible into short elevators, short elevators convertible into 9-foot elevators, and flax attachments are carried in stock and can be supplied for any machines originally purchased without these attachments.

COMBINED HEADERS.

Combined header binders are more popular than any other type. They can be used as a common header when the condition of the grain permits it to be handled without binding it, or the binder attachment can easily be attached and used when it is desirable to bind the grain. The combined header is regularly supplied with binder attachment, and a bundle carrier is furnished at an extra price. When used as a header only, without the binder attachment, it is equipped with an 8½-foot elevator, with a 9-foot folding long elevator, with or without flax attachment, or with a short elevator with or without flax attachment. Separate attachments carried in stock and which may be applied to the combined machine originally purchased without them, consist of the following: Binder attachment; long 9-foot folding elevator, with or without flax attachment; short elevator, with or without flax attachment; and flax attachment for the long elevator or for the short elevator.

In shipping common headers or combined header binders the bare machine without any of the various attachments is packed in a convenient number of cases and crates. All the different attachments enumerated above are packed separately, so that one or any number

of any of them can be separated from a large shipment without opening cases and crates and running the risk of short shipping some of the parts.

STRIPPER HARVESTERS AND CUTTER HARVESTERS.

In the great southern and western grain-growing districts, where the grain ripens slowly, many Australian stripper harvesters have been sold. These machines, of 7 or 8 foot cut, strip the heads of grain off the stalk and elevate them to a thrashing cylinder, where the grain is thrashed and cleaned. The clean grain falls into a large deposit or bagging attachment which fills grain sacks carried on a platform. American machines of this type and also Canadian machines have been sold in varying numbers in Argentina. The Australian machine was the first one in the field, and owing to an aggressive sales campaign on the part of the manufacturer, has probably been more generally sold than any other.

A new machine, the product of American factories, will no doubt take the place of these machines as soon as it is perfected. The new machine, a cutter harvester, cuts the heads of grain off the stalk in place of stripping or pulling them off. In this respect and also because it has greater capacity the new machine is better than the old type. In many sections of Argentina the stripper harvester will often pull the grain up by the roots, especially where the soil is light and sandy; when this happens the comb of the stripper is likely to chock and cause some delay. The comb is also very apt to shell out a portion of the heads it comes in contact with. This trouble is never experienced with the cutter harvester. The new machine is an improvement on the large-capacity header binder and is destined to figure largely in the Argentine trade as soon as minor changes in construction have been completed. With it harvesting and thrashing are completed in one operation, saving time and money. It may be argued that some grain is lost in the process of cutting and thrashing, and, to a certain extent, that is no doubt true. It is equally true, however, that some grain is lost in cutting in the old way, hauling grain to the stack and thrashing it. It is believed that the new cutter harvester effects a real saving in grain over the old process. The cutter harvester has gone through the experimental stages, some machines with and some without auxiliary gasoline engines for power. It is the consensus of opinion that auxiliary engines should not be used until farmers in general become more familiar with handling and repairing them.

CORN HARVESTER.

One of the greatest needs in the Argentine implement world to-day is a successful corn picker or harvester. With more than ten and one-third millions of acres of land devoted to corn cultivation and yielding abundantly the annual task of gathering the harvest is an enormous one. American pickers have been tried, and possibly more than a score, of every description, have been built and experimented with in the country itself, but none has been successful.

The light nature of the soil in the well-cultivated corn fields does not give a base firm enough to resist the tractive effort of the American machines that were tried. None of these machines was equipped

with an auxiliary gasoline engine to operate the machinery, and all had to rely wholly on the efforts of horses or oxen hitched to the machine for power. If the drive wheels slipped on account of the lightness of the soil, the machine chocked and was not given any further consideration. It is thought that a machine equipped with a gasoline engine to furnish the power might solve the problem, but no one can say to what extent farmers would be able to manage the engines, as they are not familiar with their operation. If competent operators had to be sent out with every machine to assemble it and start it and then be within easy reach if anything happened to delay the work, it is possible the machines would have to be sold at prohibitive prices. Only an experiment can determine definitely what can be done in this line. If successful, the possibilities in the way of getting a large volume of business are flattering indeed.

POTATO HARVESTERS.

The demand for potato diggers is very limited, as most of the farmers who raise potatoes for their own use simply plow the potatoes out with a walking plow. The few potato diggers carried in stock are ordinary elevator diggers, without vine turning or bagging attachments. When Argentina more nearly supplies the home demand for potatoes, and when they are more largely raised for commercial purposes, there ought to be some interesting developments in the potato-machinery line. At present hardly anything is being done nor are there any signs of an early change.

WINDMILLS AND PUMPS.

The demand for windmills in Argentina is probably greater in proportion to the number of inhabitants than in any other part of the world. Only steel mills are sold. Some of the large houses think nothing of selling 450 complete mills and towers a month. All the imported mills are of American manufacture and only an unimportant quantity is made in the country. Six, eight, ten, and twelve foot mills are sold in large numbers. The length of stroke usually required is 8 inches; a longer stroke than 9 inches is not in demand. Hundreds of mills are annually sold in the immediate vicinity of Buenos Aires, in Rosario and its suburbs, and in all the other cities and towns throughout the country. Very few municipalities have waterworks systems, hence there is a great demand for windmills. On the very large estates and cattle ranches there are often more than a dozen windmills situated in different parts of the estate. Naturally these require constant attention, as they are at work almost continuously throughout the year pumping water for the cattle.

A mill recently introduced, and one which is bound to have an enormous sale, owing to the fact that it requires little attention, is so constructed that the gears run in a deposit containing sufficient oil for a year. Any mill thus equipped, or one having self-lubricating bearings, will make an instant appeal to the suburban resident and planter alike. Winds are continual throughout the year in most sections of the country. The maximum wind velocity during storms is 74 miles per hour. The average wind velocity is about 18 miles per hour.

Towers of the four-post type range in height from 20 to 60 feet and, generally speaking, are similar in every respect to steel towers sold throughout Iowa and Illinois.

Argentina is a very promising field for manufacturers of steel windmills and towers. It is a class of business which does not have to rely on kindred lines to insure success, except that a full line of pumps, cylinders, piping, and accessories must be carried or a large volume of business can not be done. Statistics for the calendar year 1915, compiled by the Argentine Government, show that the total weight of importations of mills, with or without towers and pumps, was 7,779,781 pounds. Units are not given, as duty is assessed on a weight basis. Duty is $0.027 per kilo (27 per cent on a valuation of $0.10 per kilo). Figures compiled by the United States Department of Commerce give the value of windmill exportations to Argentina as follows: 1911, $1,158,148; 1912, $1,072,489; 1913, $558,146; 1914, $668,002; 1915, $259,208.

Eight and ten foot mills and 20 to 40 foot towers are most used. Every type of American hand, lift, force, windmill, belted-power, and some direct-connected pumps are sold in the Argentine market. These are required for use in dug, drilled, and driven wells. Direct-connected gasoline engines and power pumps are salable, but among power pumps belted-power pumps are more in demand.

In many sections of the country water is found at a depth of 12 to 20 feet below the surface. For household purposes the water is forced to a galvanized tank placed in a tower or on an adjoining building and from there piped to different parts of the house. On ranches large low tanks set on the ground, often 30 to 40 feet in diameter and about 4 feet high, contain the water for the cattle. There are other sections of the country, particularly in some parts of the western districts as one approaches the Andes Mountains, where water can be had only by drilling to a very great depth.

To give a comprehensive report covering the entire country would require devoting from six to eight months' time to this subject alone and would necessitate much traveling. There is a big field for expansion, and a business devoted to supplying windmills, pumps, piping, and accessories would have a large and profitable field of action in Argentina.

WAGONS AND FARM TRUCKS.

The American type of farm wagon is not sold in Argentina, and it is doubtful if it will ever be possible to sell wagons approaching it in likeness of construction. During 1913, the last year for which figures on wagons are available, only 54 were imported, 52 coming from the United States and 2 from the United Kingdom. Nine-tenths of Argentina is a vast undulating plain, almost dead level, without even fair country roads. Individual holdings in the country are, as a rule, very large, and there is an enormous amount of grain to be transported from fields to railway stations, often many miles away. The farmer, being anxious to market his grain almost as soon as it is thrashed, requires wagons of 5, 6, or even more tons capacity. The light nature of the soil composing what roads exist, over which these heavy loads have to pass, cause long depressions to be worn in them, which often

fill with water, forming lagoons several hundred feet long. To pass through such roads wagons have to be equipped with very high wheels, sometimes 8 to 12 feet high. At times, in order to get a wagon out of one of the water holes, the driver has to turn sharp around, farther than would be possible with our type of wagon having a reach, and for this reason a wagon with a reach which would not permit the front wheels to swing around under the wagon bed can not be sold in the rural districts. Likewise, in the cities, many of the streets are very narrow, and a full-turn-under wagon is the only one that can be turned around.

In all cities and towns and even in the farming districts there are small shops where wagons are made. In Buenos Aires there is an up-to-date factory, equipped with the latest machinery, where every type of wagon and cart can be constructed. This is the factory of E. Noé & Co., and there are many others well equipped but run on a smaller scale. There is an abndance of good hardwood in many parts of the country, which furnishes the material, except the axles. Steel for axles is imported from the United States, and in normal times from Europe also.

Even were it not for the great difference in construction, American manufacturers could not compete with the native small shops. Cost of transportation is the greatest drawback and represents a large percentage of the value of a wagon. Implement dealers do not handle wagons as they generally do in the United States. Even if manufacturers in the United States were to duplicate Argentine construction, and provided transportation costs were very low, it is doubtful if any firm would care to stock wagons in sufficient numbers to make it worth while to the manufacturer. It is the consensus of opinion that any time given to trying to develop a demand for American farm wagons and trucks in Argentina is wasted. There is every indication that present conditions will prevail for generations. Two-wheeled wagons are built in 1, $1\frac{1}{2}$, 2, $2\frac{1}{2}$, 3, and $3\frac{1}{2}$ ton sizes. Four-wheeled wagons are built in the same sizes and in 4, $4\frac{1}{2}$, 5, $5\frac{1}{2}$, 6, and $6\frac{1}{2}$ ton sizes. The very large grain wagons used in the country are often hung with metal stars, crescents, and other symbols of legendary value to the drivers and helpers who accompany them.

CARRIAGES AND PLEASURE VEHICLES.

Ever since the country emerged from its stage as a colony the four-wheeled victoria has been the popular pleasure vehicle in the cities and towns throughout the Republic. The full-turn-under victoria, with slip tongue and full leather top, is most generally used. Nearly all of these carriages are made in the country, axles and springs being imported from France and the United States, and on account of the high import duty they could not very well be imported complete. For country use the popular American surrey at one time was in great demand. The advent of low-priced motor cars has changed all this and it is expected that the demand will become smaller and smaller, gradually dying out entirely.

The American two-wheeled cart early became very popular and is sold in great numbers in all parts of the country. These carts, of many different types, some with and some without tops, are sold at

retail at prices ranging from $57 to $180. The cheaper light carts, nearly always furnished in the natural wood finish, find no competition. Of recent years many small shops have sprung up in every part of the Republic where the more expensive types have been successfully duplicated. Importations of complete carts from the United States have suffered on this account, but as the wheels and axles of all carts manufactured in the country are bought in the United States no serious loss has been sustained. Wheels on these carts are either 50, 52, or 54 inches high. The more expensive types are always fitted with lamps for burning candles, and with cushions and top to match the finish of the wood, either black or natural wood finish. Some of the cheaper types, especially those constructed for farmers, have a good-sized box hung under the seat for carrying anything the farmer wants to take to town or bring home.

MANURE SPREADERS.

Owing to the custom of permitting animals to run loose in large runs or pastures, where manures can not be saved, there is no demand for manure spreaders in Argentina. A very limited number, probably not more than a dozen, have been sold, but until farming practices undergo a radical change there will never be anything but an occasional call for spreaders.

LAND ROLLERS.

The value of the use of a land roller, especially in the linseed and small grain districts, has long been known to the Argentine farmer and many cylinder rollers, made in the country, have been sold.

Recently American-made land rollers and soil pulverizers have been introduced by two of the leading implement importers and it is expected that quite a volume of business will develop, especially with reference to the corrugated roller and pulverizer, which is made in sections and which can be knocked down and compactly prepared for export shipment. The solid cylinder roller made up of steel sheets formed into a cylinder will not be so popular. This type will have to be shipped without riveting the outside sheets to the frame, as that can be done in Argentina, and a great saving in freight will be effected by sending the sheets loose and a sufficient number of rivets to rivet them in place. In punching or drilling holes in the cylinder sheets these should be slotted, so there will be no difficulty in quickly fitting the sheets in place.

WINNOWERS.

During the period 1909 to 1913 a total of 2,240 winnowers were imported into Argentina. Of these 1,165 came from the United States, 610 from the United Kingdom, 369 from Germany, and the balance from various other countries. The demand is for a moderate-priced winnower of substantial construction. Grains to be cleaned comprise wheat, linseed, oats, barley, and especially alfalfa. Great difficu ty has been experienced in securing a machine which will separate wild mustard seed from alfalfa seed. The two seeds are of about the same size and weight and any machine which will successfully separate them can be sold in large numbers.

FEED GRINDERS.

Generally speaking, the custom of grinding feed for live stock does not prevail in Argentina. Only on very large ranches where much attention is paid to breeding fine cattle is there any demand for ground feed. Practically no ear corn is crushed or ground, nor is it necessary to furnish a mill that will grind feed and also grind fine enough for table use. There is a big demand, principally among the Italian inhabitants, for a machine which will grind fine enough for table use. The principal objection to mills of this kind which have already been marketed in Argentina is that the capacity is greater than there is any need for and that too much power is required to operate them.

The branch house of a large American implement concern has recently begun importing stone mills and is of the opinion that these will be more in demand than mills with iron burrs. Most mills with iron burrs have several sets or combinations of burrs, and to get good results the proper combination must be used. Little is known in the country regarding these different combinations, and it often happens that the mills are used in a way which rapidly wears out the burrs. Replacement is a big item of expense and will account for the small demand for this type of machine.

Corn and oats are the only grains ground. Motive power is generally furnished by gasoline engines, many of which, of 6 horsepower and under, are used for pumping water. So far as one can determine, most of the feed mills now supplied require 6-horsepower engines or even larger to maintain their capacity. A farmer who wants a mill to grind fine enough for table use does not want to purchase a mill requiring that size engine. Sweep mills are known but are not popular. The total annual sale of sweep mills in the entire Republic will not exceed 200.

Referring again to mills with iron burrs, it would seem that manufacturers now supplying them should make every effort to put complete direction sheets for their use, written in Spanish, in each case containing a mill. Nearly all the mills handled are of American manufacture.

HORSE POWERS.

The demand for horse powers in Argentina is very limited, probably not more than 200 annually being sold, according to the most reliable estimates. These are used chiefly for small corn shellers of one or two holes and for very small individual thrashing machines. Practically no mounted powers are sold. Down powers (unmounted) are furnished in three sizes, one horse, two horse, and four horse. One-horse powers should be furnished with two speeds, 22 or 23 to one and 7 or 8 to one. The shaft providing the greatest number of revolutions to one turn of the horses should be carried through the frame so that the coupling engaging a tumbling rod can be placed on either end of the shaft to get a forward and a rearward motion. Two-horse powers should be built along the same general lines, but a greater speed should be provided, about 53 or 56 revolutions of the shaft to one turn of the horses. The same remarks will apply to four-horse powers.

CORN SHELLERS.

More than 10,000,000 acres of land are devoted to corn cultivation in Argentina. An overwhelming percentage of each year's crop is exported in the form of shelled corn. The total value of corn exported in 1875 was $3,714; in 1913 the value had increased to $112,292,394; on account of conditions arising out of the European war it fell in 1915 to $93,475,450. Exports were distributed as follows: United Kingdom, 17.4 per cent; the Netherlands, 6.2 per cent; Italy, 3.5 per cent; France, 3.3 per cent; United States, 2.1 per cent; Spain, 1.7 per cent; other countries, 2.6 per cent; shipped "for orders," 63.2 per cent.

A very large part of the corn is shelled by large cylinder shellers which go from farm to farm in the corn district, as in many parts of the United States.

HAND AND SMALL POWER SHELLERS.

The most popular type of small sheller is a one-hole sheller, operated by hand, having about 300 to 370 revolutions per minute. The sheller must be equipped with a fan and feed table and irons for handling small corn. The most economical way of packing is to place five complete machines in one strong case. The case should be strapped with iron straps and the machines braced in such a way that none of the castings will be broken.

Another machine in high favor is a somewhat larger machine with a capacity of 880 to 1,500 pounds of shelled corn per hour. This is a two-hole hand or power sheller and should have a velocity of about 350 to 410 revolutions of the flywheel per minute, and 80 to 110 revolutions of the flywheel shaft per minute. Regular equipment consists of crank, fan, feed table, and a 10 by 3 inch power pulley. The machine is used in Argentina either with a one-horse down power or with a gasoline engine of 2 horsepower. The machine must be capable of perfectly shelling and cleaning short ears of smooth-grained corn, rather large in diameter at the butt and small and tapered at the tip. This sheller is often used with a double-sacking attachment but never with a long wagon-box elevator. In order to get away from expensive construction, cleaning screens of zinc or wire should not be used. Special attention must be given to the construction and location of the fan so the blast created by it will be sufficient to free the corn from small pieces of cob. There is an annual sale for more than 5,000 shellers of the one and two hole types just described. Nearly all the shellers of these two types come from the United States. Only an insignificant number have been received from other countries.

A machine for which there is a considerable demand is a two-hole self-feed sheller, equipped with a 10 by 6 inch pulley, double-sacking elevator, cob stacker, and fan. Machines of this type have a capacity of from 1,700 to 2,200 pounds of shelled corn per hour, are provided with zinc screens for cleaning, and are furnished either with or without a two-horse down power. When used with gasoline engines a 3-horsepower engine gives sufficient power and the most satisfactory flywheel speed is between 590 and 600 revolutions per minute.

Another sheller in great demand has same general construction as the one just described, but with a capacity of from 2,200 to 3,000

pounds of shelled corn per hour. This sheller has a flywheel speed of 735 revolutions per minute, is somewhat heavier in construction, and more attention has been given to the finish of its different parts and equipment. The machine comes complete with fan, self-feeder, 10 by 6 inch pulley, cob stacker, and adjustable zinc screens. The two shellers just described are also sold as mounted shellers, with or without powers. There has been much complaint that manufacturers supplying mounted shellers do not provide for enough clearance under the sheller; this ought to be not less than 14 inches. The wheels of the truck should have strong, broad tires not less than 4 inches wide.

CYLINDER POWER SHELLERS.

A field which is still open to manufacturers, and one which is very promising by reason of the fact that it has not been generally exploited, is to be found in cylinder corn shellers. Many machines of both English and American make have been sold in the Argentine market for many years. None of them has enjoyed popularity as a general-purpose machine because none has been built which will handle Argentine corn under all conditions. There are years when an abundance of rain favors the corn during the growing season and produces large ears of smooth-grained corn. More often than not under these conditions the corn, and especially the cob, is very moist when it has to be shelled. Most manufacturers have recognized this fact and have equipped their machines in such a way that they will handle corn in that condition. On the other hand, during a year of scanty rainfall it nearly always happens that a prolonged drought during the growing season stunts the ear of corn and a large percentage of the ears will not be more than 5 or 6 inches long and with a cob less than an inch in diameter. Under these conditions both grain and cob are generally dry and the cob is quite tough. The grain is short and smooth and almost round. Most of the difficulty which has been experienced with cylinder shellers is caused through the inability of the operator to adjust the machine to take these small very dry ears and shell them properly. Too many of the cobs are broken and the parts fall into the cleaned corn. Cobs are of great value in Argentina, as most of the farming country is a vast open plain without fuel of any kind.

A cylinder corn sheller which will properly shell and clean anything from popcorn to large-eared moist corn would fill a long-felt want. A good cylinder sheller would find a ready sale in two sizes—a machine having a capacity of 6,000 to 8,000 pounds of shelled corn an hour for the farmer who shells his own corn and perhaps that of two or three of his neighbors, and a machine having a capacity of 1,000 to 1,500 bushels an hour for the man who makes a business of shelling; possibly there would be a demand for a size between the two just mentioned.

In designing a cylinder sheller for the Argentine market the first point to be considered is a substantial, well-braced frame, mounted on a heavy truck with wide-tire steel wheels and plenty of clearance under the machine. Strictly speaking, in the rural districts there are no roads over which a heavy machine can travel without great difficulty. During dry weather there is from 5 to 8 inches of fine

dust or sand on the surface of the roads, and during wet weather heavy high-wheeled wagons wear deep ruts in them. All shaft-bearing boxes must be split boxes, so that when one-half becomes worn it will not be necessary to buy a whole new boxing. Transmission of power must be through shafts or belts; chain transmission is not desirable, as there is great difficulty in getting repairs if chains break. The machine easiest to sell in Argentina is one in which the working parts are accessible; the cylinder cage and the ejector fan housings, the gears, and the sieves must be accessible. If a foreign substance lodges in any one of these places, or if any of their component parts are broken, it should be possible to extract the foreign substance or make repairs without dismantling the machine.

Equipment should consist of a 14-foot drag feeder, a cob stacker, and a double sacking elevator; long wagon-box elevators are not required. All of these attachments should be built so they can be conveniently and securely carried when transporting the sheller from one place to another. A convenient arrangement for stopping the feeder, should the machine become chocked, is very desirable. The cylinder hopper into which the corn is delivered from the feeder should be of ample dimensions. All sizes of cylinder shellers should have two sets of shoes, an upper set and a lower set. Corn sieves should be of zinc or sheet steel and be adjustable and easily removable. The manufacturer who will build a strong cylinder sheller for handling Argentine corn, one that will shell all the corn and clean it and not break the cob, will win a reputation for himself in that country which will lead to business in other lines he may wish to exploit.

The boot section of the feeder on all power shellers should be of ample capacity. In Argentina the farmers cut a hole in the troja (inclosure holding the ear corn), into which the boot section of the feeder is run. As the hole is near the bottom of the troja, most of the corn falls into the boot section without the necessity of shoveling or carrying it. The flights on the elevator conveyor must not be so high that they will carry too great a quantity of ear corn to the cylinder of the machine.

THRASHERS.

In the early days of agricultural development in Argentina the farmers used the old-fashioned flail for thrashing the grain. After this came the English thrasher and portable engine and finally the most modern traction outfits of both English and American manufacture. By reason of the fact that the importing houses were often working with English capital or were wholly English in character, the English machine got an early start and had been sold in large numbers and was well known all over the country before much of an attempt was made to sell the American machines. Even when an American manufacturer of thrashers succeeded in placing his line with one of the English houses, the results of such an arrangement, owing to the preference given to the English machine, did not as a rule result happily. Things went on for some time in this way, and finally the American manufacturers decided to open up branch houses for the distribution of their product. From one standpoint they have been very successful, because they are getting a bigger share of the thrasher business with each year that goes by. It is safe to assume that they have prospered financially, or the arrangement would have

been discontinued. It is generally conceded that the American manufacturer of thrashers, more than the manufacturer of any other farm machine, can succeed only with his own branch house.

One feature of the American thrasher which assisted in marketing it was the fact that it was equipped with a self-feeder and wind stacker, two very necessary attachments, which were not until within the last few years found on English machines. It is significant that all English thrashers are now equipped with these two attachments.

Another feature of the American thrasher and one that is rapidly turning the trade in its favor is the fact that it has a cylinder which is more easy to adjust and balance than the cylinder of an English thrasher. The latter has a cylinder on which are secured grooved bars, and the grain is thrashed by what might be termed the rubbing process. When worn these grooved bars permit a considerable quantity of grain to pass out with the straw, where it is lost. If the bars become so badly worn that they have to be replaced it is almost impossible for anyone but an expert mechanic to replace them in a manner which will insure a perfect balance of the cylinder, without which the thrasher can not do good work. A feature of the English machine, however, which is very much in its favor is the substantial construction of the framework and truck. These are very strong and durable and will stand a lot of abuse.

When feeding grain into an English thrasher, unless the operator is careful to spread it out and feed evenly most of the grain is delivered to the center of the cylinder. The center rubbing bars therefore do the most work and become worn to such an extent that they have to be replaced. When this happens the expense of having a machinist of experience replace worn rubbing irons is considerable. The American thrasher has a cylinder made up of a lot of teeth. Should any of them become worn through faulty feeding it is an easy matter to replace the worn ones without disturbing the balance of the cylinder, and almost any operator of average intelligence can do the work.

For many years 5 and 5½ foot machines have been in great demand, and those sizes were most generally sold. Of late years there has been a steadily increasing demand for small-unit thrashers, and these are now being sold in large numbers. The most popular small thrasher has a 3 or 3½ foot cylinder. These machines are operated by portable gasoline engines of 10 horsepower when not equipped with self feeders and by 14 horsepower engines when equipped with self-feeders.

Although somewhat slower in taking its place in the Argentine market than many other American lines of machinery, the thrasher is gradually coming into its own, especially where factory branch sales organizations have been established. Further steady growth is assured by reason of the fact that there are still large areas of land to be brought under cultivation, and the American manufacturer now has a better idea of the requirements of the country than ever before.

THRASHING ENGINES.

The English houses which so successfully marketed English thrashers in every part of the grain-growing districts in Argentina also gave much time and attention to the sale of English thrashing engines.

At first only portable engines were sold; later these were replaced with simple traction engines, and still later with machines having high-pressure boilers and compound engines.

In many parts of the country the water contains such a high percentage of alkali that only copper water tubes can be used, and even these do not last as long as the seamless drawn-steel tubes used in engines in other parts of the country where there is an abundance of good water. English builders early realized that the foundation of a good traction thrashing engine is the boiler, consequently the boilers were built of thick plates, for high pressure, efficient service, and long life. American builders who entered the field were just as quick to recognize that a high-grade engine, even though much higher in price, was the only one to be offered for sale in the Argentine market. As engines are allowed to stand out of doors during a great part of the year, the desirability of equipping them with canopies which completely cover the working parts will at once be appreciated.

Straw is largely used as a fuel, as it has no value for other purposes. Water bottom fire boxes have been supplied by a large number of manufacturers, but many of them are now turning to the open bottom fire boxes, especially where the use of water bottom boxes would cause a lot of trouble when it is necessary to replace fire-box parts. In Argentina individual holdings are very large, and it is often necessary to take water for boilers from ponds along the road; in the newer settled parts of the country many of the wells are open dug wells, and in either case the water is apt to contain a lot of sediment which bakes fast to the boiler plates, unless frequently cleaned out. A number of handholes which will enable the operator to quickly clean out the boiler by flushing it are essential. In every part of the agricultural district the land is gently rolling and there are no steep hills; therefore there is no need for a complicated draft adjustment to maintain the steam pressure at a certain stage for hill climbing. What is most sought after in the Argentine market is a strong, powerful engine, built of only the best of materials, with all working parts well finished and perfect fitting; an engine whose parts are easily adjustable and which are accessible, and one that has a long life even when in the hands of a none too competent operator. Special features which appeal to the experienced thrasher man in the United States will also appeal to the Argentine owner.

SILOS AND SILAGE CUTTERS.

Only a limited number of silos have been introduced and sold in Argentina, and generally speaking, there are only a few farmers who know what a silo is and a smaller number yet who have fed silage to their stock. There is no doubt that the feeding of silage for 90 to 120 days a year would make a lot of money for some of the cattlemen and prevent serious and heavy losses which they now often sustain, especially in a year of scanty rainfall when many animals are lost because of the impossibility of providing food for them.

A few of the more advanced cattlemen feed what might be termed silage but it is neither prepared in the way it is prepared in the United States nor are the same crops used. These cattlemen cut alfalfa when it is green and immediately stack it without giving it a chance to cure. When a stack is finished, earth to the depth of about 5 feet

is placed on top of the stack to compress the green alfalfa and force out all the air. The natural silo thus formed is very inexpensive and keeps the green alfalfa in good condition for feeding as long as there is any necessity for using it.

American wood-stave silos have been imported to the number of about 15. Some of these were refused by the purchasers for the reason that the lumber used was not seasoned and was so warped out of shape as to make erection impossible. This would indicate that the metal silo is the only one for the export trade. Once its good points become known, the silo is going to have a sale in the Argentine market, but without doubt those sold will be made in the country, as large quantities of the material are imported every year, and they can be constructed here cheaper than they can be brought from the United States. Several implement importers in Buenos Aires have imported sample silos and have made an honest effort to sell them, but unfortunately they have not been very successful. A 100-ton steel silo, with silage cutter and an engine to operate the cutter, has to be sold for about $1,500 and there are very few people who are willing to pay that price. When the value of silage becomes more generally known there is no doubt but that large numbers of silos will be sold, and American manufacturers will have an opportunity of selling the cutters and engines, as these can not be made in Argentina.

The distribution of literature regarding the preparation and use of silage has attracted considerable interest. Many ranchmen have very eagerly sought to post themselves regarding the value of silage as a feed and how to prepare it and what crops to use. If there is any development in the future it is not thought that American manufacturers of silos will be benefited, unless they are prepared to furnish silage cutters.

Only a few silage cutters have been sold. These have been of both the cylinder and knife-on-flywheel types. Until more of them are in use and until they have been more experimented with, it is difficult to tell which type will become the most popular. A number of well-posted implement men have stated that they seriously doubt the advisability of recommending that American manufacturers of silos spend money and time in trying to develop a demand for silos. When present world-wide conditions which have arisen out of the war in Europe have a chance to readjust themselves it is possible that another story might be told. Until the war is over and people in Argentina know what effect the settlement will have on them, anything new and which requires the outlay of considerable money to install will receive very little attention. In the Provinces of Santa Fe and Cordoba there will never be much of a demand for silos; the market would probably be confined to the Province of Buenos Aires and to that part of the pampa bordering the Province of Buenos Aires.

GASOLINE ENGINES.

TRACTORS.

Some years ago importers and manufacturers whom they represented took a lot of interest in developing a demand for tractors for power plowing. Early results with the use of American gasoline tractors of 30 to 40 horsepower draw-bar pull were very flattering, and in some

years more than 150 tractors were sold. The demand was especially great during years of scanty rainfall when the ground was too hard to be plowed in the ordinary way with horses or oxen. Since 1912 sales have fallen off to such an extent that the total business now done by all the houses will not equal that done by one of them prior to that time. The greatest difficulty is the cost of gasoline, which now sells at about 60 cents a gallon. There is no economy in trying to use kerosene as a fuel, because the heavy import duty and the difference in its value as a fuel makes its price about the same as the price of gasoline. Generally speaking, power plowing is not carried on to any great extent. When a very dry season makes it necessary to use power plows steam traction engines usually are employed, as there are large numbers in the country and they are cheaper to operate than gasoline tractors. During the last plowing season, owing to a long drought in the northern part of the pampa region, there was a natural market for tractors, but nothing could be done on account of the high cost of fuel. It has been stated that a large area of land formerly devoted to agriculture will have to go unplowed this year.

At the present time gasoline tractors can not be used for operating thrashers, as it is impossible to bring the cost of fuel low enough to allow them to compete with straw-burning steam engines. The building of country roads has not yet developed sufficiently to make the use of the gasoline tractor desirable. If it were possible to influence legislation to the extent of lowering the duty on kerosene or entirely removing it, the tractor business and also the gas-engine business would receive new life; under present conditions very little can be done.

STATIONARY AND PORTABLE ENGINES.

In Argentina stationary and portable gasoline engines are used for pumping water, running corn shellers and small 3-foot thrashers, and for operating a varied lot of machinery in blacksmith and small machine shops. Their use on farms is not so general as in the United States, and, generally speaking, farmers are not used to them nor do they understand their operation. In each community there are mechanics who do understand the engines and whom the farmers could call on for assistance if the price of fuel would permit them to use gasoline engines for general farm work. There are two grades of fuel widely used in all parts of the country, gasoline testing from 58 to 63 degrees and a gas oil testing from 29 to 33 degrees on the Baumé scale. As a rule, however, the two fuels are mixed so as to form a fuel testing 44 degrees Baumé. The high cost of gasoline, with kerosene a very close second, makes the use of those fuels out of the question. Gas oil can not be used alone in any but special engines; hence the need for the mixture, which is not as satisfactory as a good grade of kerosene would be, provided it could be had at a reasonable price.

Both vertical and horizontal gasoline engines are sold, but the tendency is toward the use of the horizontal engines. Three and five horsepower vertical engines, and 1, 2, 3, 4, 5, 6, 8, 10, and 14 horsepower horizontal engines are the most popular sizes. In gasoline engines American manufacturers have the largest share of the trade, but European and British engines which burn crude oil are much more widely sold than the American engine of that type. As

in nearly everything he purchases, the farmer or business man in Argentina is looking for a high-grade moderate priced engine rather than for a cheap one.

All of the large implement houses handle gasoline engines, but a majority of them have signed a convenio or agreement which governs the price and regulates the terms on which engines shall be sold and the number that may be sent to any one dealer as samples or on consignment. As there are a number of small houses which are not in the convenio and are not governed by its terms, it is thought that possibly they have a better chance of getting a larger share of the business than they could do otherwise, and the convenio members, while they are all on an equal basis, do not have a wide enough field of action under the terms of the convenio.

If the time ever comes when duties and taxes are removed from kerosene or when they are lowered to an extent which will permit that fuel to be generally employed in internal-combustion engines, there will be a natural market for engines in Argentina, the extent and volume of which will be a surprise to those who have not had an opportunity to give the subject considerable attention. The development of the Government owned and operated oil wells at Comodoro Rivadavia on a larger scale, especially if it resulted in the production of a good grade of kerosene that could be marketed at a reasonable price, would prove of great benefit to agriculture, because the farmer could then use tractors and stationary and portable engines for a number of tasks which under present conditions must be done in other ways or be left undone.

The popular type of small gasoline or kerosene engine is one with the make-and-break system of ignition and with hit-and-miss governor. For operating power corn shellers and small 3-foot thrashers many throttle-governing portable engines are sold. Most of these are of 8, 10, or 14 horsepower.

Figures compiled by the United States Department of Commerce show that the following number of gasoline engines were exported to Argentina during fiscal years ended June 30: In 1912, 2,339; in 1913, 1,647; in 1914, 1,067.

Dealers in the interior who sell gasoline engines seldom carry a stock and rely entirely on the importer to supply them when there is a call for engines. Generally speaking, interior merchants do not understand the operation and handling of a gasoline engine any better than the farmer does, which accounts in a large measure for their reluctance to keep a stock of engines and push their sale. An educational campaign among dealers and farmers like that which has been so consistently followed in the United States for many years would produce good results if it were not for the high cost of fuel. With fuel at its present price it is doubtful if the results would warrant the outlay necessary to make a general campaign. In the first place, traveling expenses range from 30 to 50 per cent higher than in this country, and it is necessary to see the dealers and farmers personally, as many of the latter can not read advertising literature. To carry on a sales and educational campaign of this kind would doubtless cost more than the results would warrant.

IV. TRADE METHODS AND SUGGESTIONS.

The greater part of the farm implements and machinery sold in Argentina is imported by three large firms and about six or seven smaller ones. An agreement or convenio has been entered into which fixes prices and terms of sale governing nearly all lines, and most of the houses are parties to the agreement. Any member who has signed the convenio and who sells goods below the established price or who violates the clauses regarding consignment of machinery and terms is penalized by a heavy fine. The success of the convenio has resulted in placing the business as a whole on a more satisfactory basis. The prices agreed upon are fair to both importer and consumer, as only a fair margin of profit is added to the landed cost of the goods, plus the cost of doing business. It is significant that houses who have not signed the convenio and who do not operate under its terms can at best only grant a retail dealer a commission of 20 per cent from list in place of 15 per cent given under the terms of the convenio.

The large firms and several of the smaller ones have branch houses in Rosario, Bahia Blanca, and several other cities, all important centers in the districts where they are located. These firms are wholesalers as well as retailers. Big stocks of goods are carried at the branch houses, and travelers or "blockmen," assisted by the necessary number of mechanics or experts, are sent out from the main houses and from the branch houses.

Most of the importing firms handle hardware, lumber, automobiles, sanitary and plumbing supplies, electrical, industrial, and farm machinery, tools, and a varied stock of kindred lines. Most of the firms own the properties they occupy, and some of them are among the handsomest of their kind in the world. The methods of handling the business are very systematic, and both in the house and in the field are similar to methods employed in the same lines in the United States. The important lines are separated into departments with a manager in charge of each. All of the houses, by reason of the fact that they have been long established in the country and are well and favorably known, have an important mail-order business. In order to properly handle the mail-order business and to assist the traveling salesmen the houses prepare handsome general catalogues, all of which are printed in the Spanish language, and supplement these with special catalogues covering separate lines and with neatly printed circulars and envelope inserts.

Two of the large importing houses are English, with offices in London and New York City. Another is German, with a purchasing office in New York City. One of the houses of secondary importance, probably the largest in its class, is German, and has a representative in New York City.

Native firms and even foreign firms not already engaged in the importation of agricultural implements and kindred lines—and espe-

cially is this true of the hundreds of retail dealers in the country—have no desire to enter the business and import for their own account in competition with the large old-established houses. Occasionally some one with the idea that he can make some easy money seeks the agency of a foreign manufacturer: generally he begins by asking the manufacturer to advance a considerable sum for propaganda work, which sum, if advanced, is expended in salary and traveling expenses incurred by the commission agent. The implement trade in Argentina is well established, is based on a solid foundation, and manufacturers would do well to avoid any propositions of this kind. Those who are in a position to get any considerable amount of business in any of the implement or farm-machinery lines do not have to resort to such tactics to get a good start. This is a true report of the Argentine situation, but it is altogether likely that the statement will have to be modified somewhat in writing about Brazil and some of the other South American countries.

CONCENTRATION OF THE IMPORT BUSINESS.

For years the tendency in the implement business in Argentina has been toward concentration in the hands of a few, and this tendency will increase rather than diminish. It is a recognized fact that a house without a good harvesting-machinery line can not for very long hold a prominent place as an implement and farm-machinery house, and as the sources of supply for this very necessary line are limited, it is doubtful if the conditions which now prevail will change in years to come. A very great percentage of the American implements and farm machinery imported into Argentina is sold by factory sales organizations direct to the importer. New York commission merchants have done some wonderfully good work in assisting the smaller manufacturers to get started, but the volume of business which they can get must be limited, for the reason that they do not carry large stocks of implements and repair parts.

Most manufacturers who sell direct to importers have self-renewing contracts which run from year to year and provide for an annual meeting for the purpose of adjusting prices, should market conditions warrant it. Many of the larger houses place with manufacturers large orders which are carried in open account and are executed without question.

An overwhelming percentage of the implements and farm machines and kindred lines imported into Argentina is of American manufacture. This is due to the fact that a large area of similar agricultural country in the United States has given rise to the production of large quantities of implements of the most advanced type, which can be produced here in large quantities at lower prices than elsewhere. Most agricultural implements are entered free of duty and the tariff on the remainder is so low as to be hardly worthy of mention.

OPPORTUNITIES FOR SMALL MANUFACTURERS.

The question most frequently asked with reference to the Argentine market is whether or not the small manufacturer can compete, and to this the answer must be both yes and no. Some of the smallest manufacturers in their respective lines have succeeded in doing a

large volume of business through jobbers in Buenos Aires, a volume which has compared very favorably with that obtained by the large manufacturers in the same lines. The whole secret lies in getting a good, lasting connection with a Buenos Aires importer. On the other hand, through the lack of suitable connections, some very large manufacturers have been in a position to get only a limited amount of business, and many small manufacturers have found themselves in the same position. If a manufacturer loses an agency in Buenos Aires, no matter whether he is a large one or a small one, he will have great difficulty in placing his line unless he can and wants to open a branch house. This is due to the fact that new firms, as a general rule, are not seeking to enter the implement business. The manufacturer seeking to place an implement line with any importer in Buenos Aires, which is the center of the industry, must be certain that the house to which he entrusts his business has a good, active harvesting-machinery line. If it has no harvesting-machinery line, it can not get a big share of the trade in any implement line.

Agricultural implement importing houses in Buenos Aires all have full and complete lines of implements of American manufacture, and it is a very rare occurrence to find one of them in the market for a new line, unless of course it is something entirely new to the industry. Buenos Aires importing houses have assisted the manufacturers whom they represent in building up their lines, so that all of them are now highly perfected and will not require many changes in construction. The importer, after working in perfect harmony with the manufacturer for so many years, does not have any desire to break off the pleasant relationship which has existed between them, nor is the manufacturer, as a rule, seeking to make a change.

ESTABLISHMENT OF BRANCH HOUSES.

The testimony of everyone in the implement trade in Argentina to-day is to the effect that small manufacturers would have to unite with other small manufacturers handling related lines and establish joint branch houses in Buenos Aires, Rosario, and Bahia Blanca, with the main house in Buenos Aires. A house of this kind, provided it is managed by competent technical men in conjunction with men having a good knowledge of the country, and also provided it was equipped with a good harvesting-machinery line as well as other lines for which there is a demand, and which are described in this report, could not help but succeed. Growth would not be rapid, but it would be steady. There is an immense field for the sale of American implements, and it will continue to expand indefinitely. The people of the country like American implements and are used to handling them. While at one time long credits were the rule rather than the exception, all of that has been done away with. Few lines of endeavor present so many possibilities for steady growth and expansion as the implement business in Argentina, if handled under an arrangement suggested above. Within the country are many young and middle-aged men familiar with the implement business, speaking both English and Spanish, and also having a good knowledge of the country and its requirements, who may be employed in the office or as traveling salesmen.

BRANCH-HOUSE TERRITORY.

A branch house in Bahia Blanca can properly handle the southern and southwestern agricultural districts of the Republic, working northward until it comes to the territory which can better be handled by the main branch house in Buenos Aires. The main branch house, with possibly one or two transfer houses in important centers of its territory can handle all of the central part of the Republic from Buenos Aires westward and northward as far as Rosario. The Rosario branch can well take care of the northern part of the Republic.

A combination of three branch houses, situated in the three important cities, all of which are ports, with warehouse facilities at each place for storing goods, with from 12 to 15 "blockmen" or traveling salesmen, each assisted by from 2 to 5 experts or mechanics, and with a complete line of farm implements and machinery is one that is hard to beat. Careful attention to every detail of the business, prompt execution of orders for machinery or repairs, and real service to the purchasing public would insure success and enable small manufacturers to have a share of export business which would help to keep their factories running during the dull season at home and thus cut down the overhead expenses.

RENTS.

In Bahia Blanca and in Rosario suitable offices and sample rooms can be rented for $200 to $225 a month. In Buenos Aires the rent would be very much higher and would range between $450 and $900 a month, depending on the size of the building. Warehouses in each of these three centers would cost from $250 to $500 a month, depending on size and location. Electric light service is not an important item, because the heaviest work comes in summer when the days are long and no artificial light is required; even in winter this service is generally not required during more than two hours of the day.

EMPLOYEES AND SALARIES.

Plenty of reasonably efficient clerical help can be found in any of the three port cities where the establishment of branch houses would be necessary. Salaries paid will probably not average more than 10 per cent more than is paid for similar work in the United States, and considering the difference in the cost of living, which is much higher in Argentina than in the United States, the extra amount of money expended for clerical help is of minor importance.

In a branch-house organization it would be advisable to have some American men of wide experience in charge of the different departments. On account of the high cost of living and the great expense of even the simplest forms of amusements, the salaries of American executives would have to be increased by from 25 to 50 per cent over corresponding salaries in the United States. The exact amount would depend entirely on the man; some men are much more efficient when they have a reasonable amount of money to spend in pleasure out of business hours, and their efficiency should not be cut down by denying them the small extra amount it would take to allow them to develop on natural lines. On the other hand, it would

not be wise to give a man who saves every cent of his salary and cares nothing for outside pleasure the same salary as one who does his best work when he is permitted to follow his natural inclinations. This is even more true of a man many miles away from home in a foreign country than of one away from home in his own country. The field work should be handled by men who have had traveling sales experience in the United States, and there ought to be at least one general traveler, also with American experience, who could go to any salesman's territory and give him friendly cooperation and assistance.

PROFITS.

Manufacturers who want to enter the Argentine or any other foreign market should arrange to quote prices for their product, properly boxed for export shipment and delivered f. a. s. New York City. No single thing leads to so much trouble as the quoting of prices f. o. b. cars at factory, f. o. b. cars in New York City, or in any other place. The foreign merchant wants to know what the goods he intends purchasing are going to cost him f. a. s. in New York Harbor, so he can figure the landed cost at his port.

In normal times, prior to the war in Europe, Buenos Aires importers of implements generally figured that 25 per cent added to the cost f. a. s. in New York Harbor would allow enough margin to pay all costs incident to putting the goods in a warehouse in one of the three port cities in Argentina. In other words, the price f. a. s. in New York Harbor with 25 per cent added represents the landed cost in an Argentine port. These figures seem somewhat high, but as a majority of the importing houses figure their landed costs in that way it is better to use the figures they do. To the landed cost 56 per cent is added to find the list price, which is also the retail price. To dealers a discount of 15 per cent is given, with an additional discount of 5 per cent for cash in 30 days.

In the case of repairs a different method is used. With the exception of a few very necessary repairs, the nature of which causes them to wear out very rapidly and on which special prices are given, the American manufacturer's list price is multiplied by five, and the result is the Argentine list price in paper money. In other words, a repair listed at $1 in the American manufacturer's catalogue is listed at $5 Argentine paper in the Argentine importer's catalogue. An Argentine paper dollar is worth $0.4246 American money, therefore the Argentine list price is $2.12 American money. Dealers get a discount of 15 per cent with an additional discount of 5 per cent for cash in 30 days. As most American manufacturers allow a discount from list of 50 per cent or even more, a repair listed in the American catalogue at $1 can be placed in a warehouse by the Argentine importer at a price which does not exceed $0.63. If the repair is sold at retail the selling price is $2.12; if at wholesale the selling price is $1.71, assuming that advantage is taken of the cash discount.

The selling prices of all implements and repairs in Argentina leave a substantial margin of profit, the business is a good, clean one, always full of interest, and one that merits careful study and attention.

The large manufacturer, if he loses a valuable agent who has been handling his lines for years, is no better off than a small manufac-

turer in the same position. Either of them will find it very difficult to make new arrangements, and generally the only course left open is to establish a branch house. Manufacturers, either large or small, who have not been doing business in Argentina can only hope to do business in that country by opening their own branch houses or by joining with other manufacturers and opening joint branch houses.

CREDITS AND BANKING FACILITIES.

The question of credits in Argentina is not so difficult as in some other South American countries. The large importing houses are very strong and have high commercial ratings. These large houses generally make contracts with the manufacturers whose lines they sell, and the contracts are self-renewing and provide for an annual meeting to adjust prices should market conditions warrant any change.

In all parts of the interior of the country one finds large retail houses which are also very strong, and which, generally speaking, are old-established houses. Of late years these retail merchants in increasing numbers have recognized the value of supplying commercial agencies with full information regarding their financial standing. It is a very easy matter for American manufacturers to obtain the credit rating of Argentine firms through American mercantile agencies. The National City Bank of New York has a branch establishment in Buenos Aires and correspondents in Rosario.

Among scores of banks of all nationalities the Banco de la Nacion (Bank of the Nation) is the most important. There are a number of very strong and important British and European banks, nearly all of which do an international business.

LANGUAGE, CURRENCY, WEIGHTS, AND MEASURES.

Spanish is the official language of Argentina and is the only language generally used in business. The thousands of Italians who settled in the country soon learned to speak Spanish and have given the language many phrases from the Italian, so there is a considerable difference between pure Castilian and the language spoken in Argentina. Catalogues for importers and wholesale dealers need be printed only in English. Those for general distribution in the country must be printed in Spanish, and it is a waste of time and money to send anything else.

Argentine currency is on a gold basis, but very little gold is ever used in commercial transactions. The paper peso and nickel coins are generally circulated, the latter in denominations of 5, 10, and 20 cents, paper values. Everyone is familiar with American currency, and prices may be quoted and invoices made out in that currency. The metric system of weights and measures is used throughout the Republic. Important measures are the hectare, equal to 2.47 acres; the kilometer, equal to 0.6214 mile; and the kilo, equal to 2.2 avoirdupois pounds.

TRANSPORTATION ROUTES—RAILWAYS.

In normal times good transportation facilities are provided between New York City and Buenos Aires, Rosario, and Bahia Blanca. There

are regular mail boats at least every two weeks, and generally much oftener. Besides these there are a large number of freight steamers. The time from New York to Buenos Aires by mail steamers is 24 days, and freight boats make the trip in 24 to 30 days. Just now there is a great scarcity of steamers, and freight rates have risen in some instances 400 or 500 per cent. In all probability that condition will continue until the end of the European war.

All important centers in Argentina are connected by a network of railways which extends to all parts of the country. In 1857 there were 6.2 miles of railway line, with invested capital of $285,108; in 1914 there were 21,350 miles, representing capital of $1,236,723,022. The railways for the most part have been built with British capital, and the most important ones are British owned. The railways are under the jurisdiction of the Minister of Public Works and are controlled by the General Railway Board. Until 1872 the Government exercised no control over the operations of the railway companies. Even then an attempt was made only to fiscalize the accounts, and details regarding working and exploitation were not touched by the Government. A new law, passed in 1891, enlarged the powers of the Government in the latter respect. It created the General Railway Board, which actively intervenes in questions arising out of the administration and legal status of the different companies. The functions of the General Railway Board are to maintain harmonious relations between the companies and the public and to guard the interests of each.

All materials for railway construction, maintenance, and exploitation are imported free of duty, and the railways are free from any taxation. Three per cent of the net profits of each company, however, must be used in the construction of roads of access to stations. The total yield of this levy for the year ended June 30, 1914, was $3,108,028 paper. New material imported free of duty during the same period was valued at more than $27,000,000 paper. A frequent service of good trains is maintained to all portions of the settled districts of the Republic.

SUGGESTIONS TO MANUFACTURERS.

Argentina offers a market in the different lines which is full of possibilities. The country is bound to grow and expand, and as even now it is more important than many European countries, it will one day be the largest country in the world speaking a Latin tongue. The steady increase in the importation of agricultural implements until the outbreak of the European war unsettled trading conditions may be taken as an indication of what will happen again as soon as conditions become more settled.

Argentina is a very attractive country. It grows on one the more he sees of it. Its people are very hospitable, and it is a pleasure to do business with them, especially in the implement lines, because everything is done on a large scale without much annoyance from too great attention to petty detail. Men selected to represent American manufacturers should be men of wide general experience and dignified bearing.

Manufacturers who can make a short visit to Argentina will never regret the expense of time and money and can learn more from per-

sonal observation in a short time than they can be told by anyone, no matter how familiar he may be with the country and with every detail of the business in which they are interested.

ARGENTINE INTERNATIONAL TRADE.

Since the beginning of the European war, despite the fact that Argentina's position was strengthened by an increase in value of agricultural and animal products, the trade with other countries has suffered a severe check, due to the lack of sufficient ships. During the last six months of 1915 conditions improved somewhat, but there is room for great improvement at this date (May, 1916).

The total foreign trade of Argentina during the last three years is represented by the following figures: 1913, $904,857,089; 1914, $621,072,041; 1915, $785,173,376. The surplus of exports over imports in the same years was $62,152,005, $77,436,241, and $331,387,910, respectively. In 1915 the imports totaled $226,892,733 and the exports $558,280,643. The foregoing figures and those in the first three tables following are for calendar years and are given in Argentine gold currency, $1 of which equals $0.965 United States currency.

The following table shows the development of Argentine foreign commerce by decades during the period 1866 to 1915:

Years.	Total foreign trade.	Increase over former decade.	
		Amount.	Per cent.
1866–1875	$875,559,141	.....	.....
1876–1885	1,164,405,854	$288,846,713	32.9
1886–1895	2,068,549,494	904,143,640	77.6
1896–1905	3,135,390,608	1,066,841,114	51.5
1906–1915	7,075,626,271	3,940,235,663	125.6

The progress of the meat trade is shown in the next table, which gives exports of live stock and meat products in 1885 and 1915:

Articles.	1885	1915	Articles.	1885	1915
Live stock:			Extract of meat	.....	$743,298
Cattle	$2,345,313	$3,100,830	Powdered meat	.....	141,439
Sheep	58,552	72,504	Preserved tongues	.....	170,947
Chilled and frozen beef	1,680	76,175,100	Condensed soup	.....	565,471
Frozen mutton	75,323	6,307,190	Jerked beef	$4,204,077	50,941
Sundry frozen meats	.....	725,278			
Sundry meats preserved	.....	3,194,407	Total	6,684,945	91,247,405

The progress made in the export of grain and cereals has been still more rapid during the same period, as indicated by the following table:

Articles.	1885	1915
Oats	.....	$19,065,704
Corn	$3,957,191	93,475,450
Wheat	3,139,736	132,632,073
Wheat flour	521,295	10,071,960
Linseed	3,471,305	46,100,866
Total	11,089,527	301,346,053

The following figures show the effects of the European war on trade between South America and the United States:

Years, ended June 30—	Imports from South America.				Exports to South America.			
	Total.	Increase.	Argentina's share.	Increase.	Total.	Decrease.	Argentina's share.	Decrease.
		Per cent.		*Per cent.*		*Per cent.*		*Per cent.*
1913	$217,734,629	.....	$26,863,732	.....	$146,147,993	.....	$52,849,834	.....
1914	222,677,075	2.3	45,123,988	67.9	124,539,909	14.8	45,179,089	14.6
1915	261,489,563	17.4	73,766,258	63.5	99,323,957	20.2	32,549,606	27.9

The following table gives the value of the principal articles exported from the United States to Argentina during the fiscal year 1914. Agricultural implements do not make a good showing for reasons explained elsewhere.

Articles.	Value.	Articles.	Value.
Oils, animal, mineral, and vegetable	$8,114,629	Automobiles, bicycles, motor and other cycles, and parts of	$1,146,658
Engines, locomotives and railway material	5,557,770	Fibers, vegetable, and manufactures of	1,790,054
Wood, and manufactures of	7,385,650	Chemicals, drugs, dyes, and medicines	1,048,833
Agricultural implements	4,344,886	Naval stores	777,686
Iron and steel, partly manufactured and manufactures of	4,307,669	Paper, and manufactures of	730,313
Cars, carriages, and other vehicles	1,504,454	Other goods	6,519,866
Leather, and manufactures of	1,980,721	Total	45,179,089

Argentina received 36.3 per cent of all the exports sent from the United States to South America in 1914.

NOTE.—A list of the principal importers of agricultural implements and machinery in Argentina may be obtained from the Bureau of Foreign and Domestic Commerce or its branch and cooperative offices.

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